40 Rock

POPULAR Computing WEEKLY

35p 15-21 December 1983 Vol 2 No 50

This Week

STAR
Abandon Earth on Vic20. See page 10.
GAME

News Desk

Oric 2 gets go-ahead

FOLLOWING its take-over by Edenspring Investments Oric has put back plans for an IBM PC compatible micro

Instead, the company will go ahead with development of a new home computer — the One 2 — that will compete with the Electron and Commodore 64 machines

The Oric 2 will be broadly similar to the first Oric machine It will run the same form of Basic in an improved Oric Rom containing some extra commands including *Verify* and *Merge* According to Tansoft's Paul Kaufman though "All the existing Tansoft software will work with the new machine "

With 64K Ram the Oric 2 will have more memory than the Oric 1 Most of the additional memory will be used as video Ram The computer will also feature a full size full-travel keyboard and a completely new manual

The Oric 2 is scheduled for launch in early March and will appear after the new Sinclair professional computer' now expected in late February

What future now for Atari?

THERE is increasing speculation that Warner Communications may sell its ailing Atari computer division

This follows the recent purchase by Australian publisher Rupert Murdoch of 6 7 percent of Warner Communications Murdoch paid $98m for 4 4m shares making it Warner's largest single shareholder

The most likely attraction of Warner Communications is its extensive film library and 50 percent share in Warner Amex Cable Communications Murdoch is already heavily in volved in cable and satellite communications with News America Skyband and Satellite Television UK and the Warner's film library would make a rich killing

Warner Communications is in deep financial trouble mainly brought about by its Atari computer division which has lost in excess of $500m in the last nine months

It is now considered possible that Murdoch may try to swap his shares for Warner Bros Pictures

In the event of a Murdoch

Continued on page 5


Publisher Rupert Murdoch

Continued on page 73

BRITAIN'S BEST-SELLING MICRO WEEKLY





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You must dig for those nuggets (1) – But watch out for the giant rats (2) They burrow through the earth (3) to get into your tunnel You can delay them for a while by knocking down a support (4) which causes a small cave in (5) to block their way but you can only destroy them by releasing a snake (6) from it s nest (7), when it heads straight for the surface, destroying everything in it's way

All the time the Gremlin (8) is busy digging it's way through your waste earth pile (9) to reach the entrance to your mine Once it does you have no escape!! so you must stop it getting there by returning to the surface to replenish the main mound (9) with the smaller pile of earth which appears on the surface as you dig (10) The deeper you dig the more points you score – but the further you have to go to replenish that mound! Once all nuggets have been collected a cave opens (11) allowing you to pass through to the next stage – if you can reach it! This gives you more rats – but less snakes to destroy them with!!

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Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish, although we will always try our hardest to make sure programs work.

This Week

Editorial

Newspaper magnate Rupert Murdoch has spent nearly $100m in acquiring a 6.7 percent share of Warner Communications. This makes Mr Murdoch, in the form of his News Corporation, the largest single shareholder in Warner.

This information is of more than esoteric interest because Warner numbers Atari among its subsidiaries. Atari, once the jewel in Warner's crown, has lost more than $536m so far this year.

Both Warner and Rupert Murdoch would appear to be anxious to rid themselves of Atari as soon as possible. Warner can hardly continue to absorb losses on such a massive scale while Murdoch's interest lies in Warner's film and tv operations. Atari has suddenly become persona non grata in a very big way.

However, while Warner and Murdoch might wish to offload Atari, who would want to buy it? Given the current state of the micro market, it is extremely unlikely that anyone will be able to turn Atari round and start making a profit — at least not in the short-term.

US companies, aware of the problems that have beset Texas, Mattel, Osborne and other micro firms, are unlikely to see any advantage in buying Atari. But European companies might see Atari as a useful entry to the American market which is potentially the most profitable in the world.

Next Thursday

Can you guide Santa up and down chimneys and ladders in time to deposit all his presents? Find out in next week's star game for the Spectrum.


martech games
...a spectacular range of software
BLASTERMIND!
SPECTRUM 48k £5 50
At first glance this might seem to be just another version of a very popular game How wrong can you be! True the start is simple enough The Spectrum picks a code of numbers or colours with a selection of levels of difficulty — and invites you to do the same You then take it in turns to guess each others code from the clue supplied after each guess An extremely well written fast and very clearly displayed game with almost inevitable defeat
This was exactly as intended but unfortunately something went wrong During the programming strange uncomplimentary messages began to appear on the screen At first they were so few they were not taken too seriously but soon they could no longer be ignored Somehow the Spectrum had been given a personality — a rather devious supercilious dislikeable hateful horrible mino
Side B contains a version of the game compatible with the excellent Currah µSpeech unit — even worse!!
The Quest of Merravid
VIC 20 (16k) £7 95 or Commodore 64 £7.95
A really challenging and enjoyable adventure written by a confirmed adventure addict who grew tired of the ease with which he solved other adventures himself Will accept and act on sentences containing up to nine words
The adventurer becomes Merravid charged with the task of finding taking and then returning the magic Firestone of the Dwarves However overcoming the many novel and original hazards is no easy matter Careful and imaginative thought is required if progress is to be made ere the Firestone tracked down to the lair of the Dragon of Thargon Even then the Dragon has to be defeated and the stone retrieved A compulsive extremely enjoyable and very user friendly adventure
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His master's voice sounds from Commodore

COMMODORE will launch its long-awaited *Magic Voice* speech synthesiser unit in January, priced around £50

The small hardware add-on plugs into the expansion port on the Commodore 64 Software held in Rom inside the unit gives it a vocabulary of 234 words and letters which, with the exception of Z (Zee), are pronounced in an acceptable mid Atlantic accent

As well as the complete alphabet and the numbers 1 to 12 a selection of phonetic sounds are included to enable new words to be built up

The unit is controlled from Basic with the simple command *Say* "X"

A number of speaking Rom cartridge programs are planned to accompany the Magic Voice These plug into a cartridge port on the top of the unit Among these are the Magic *Garden* and *Magic Toolbox* educational series of talking books from Edata the *BJ Bear* educational programs, two arcade games *Wizard of Wor* and *Gorf* and *Magic Desk 2*

Atari future

Continued from page 1

take over of Warners film and cable interests, Atari could be sold off to a European electronics conglomerate Warners would still retain its music and book publishing interests

Both Thorn EMI and Philips have been mentioned as possible buyers of Atari, with the latter being the more likely candidate The Dutch electronics giant Philips has so far failed to make any real impact in the computer and video games market Sales of its G7000 video games machine come a poor third behind Atari's own VCS and Mattel's Intellivision

Speculation that Philips might take over Atari has been increased by the announcement in July that Warners and Philips plan to merge their record music interests

Philips at present has a 50 percent stake in Polygram The other half is owned by the German company Siemens Two new companies are to be formed between Polygram and Warners in which Siemens is to hold a considerably reduced interest

Commenting on suggestions of a Philips take over of Atari, Graham Clark, managing director of Atari UK said "I am aware of the speculation but it would appear to be the result of confusion with the Philips-Warner record deal

'Any take-over of Atari would seem very unlikely from what I know "

Dragon 'poke' runs into problems

DRAGON software houses selling programs which use the so-called speed-up *Poke* are running into problems of software incompatibility

In earlier versions of the Dragon 32, the command *Poke 65495 0* (Hex HFFD7,0) can be used to increase the operating speed of the Dragon's 6809E processor A number of software houses have taken advantage of this fact to make their games run faster

The problem is that around 20 percent of Dragons now being produced will not accept the speed-up *Poke* command and therefore the games will not run Among the programs affected are Beyond Software's *Up Periscope* and C-Tech's *Flight Simulation*

The Dragon's 6809E processor is rated at a maximum operating clock speed of 1MHz and runs in normal use at 0 98MHz The speed up *Poke* increases the clock rate to 1 8MHz It then depends on the tolerance of individual chips whether a particular machine will accept the *Poke* command

One company which has found a solution to the problem is Microdeal Its programs offer a menu choice at the start of each game where the Dragon owner can choose to play a version either with or without the speed-up *Poke*, de pending on whether or not the Dragon concerned will accept it

Dragon's Cathy Hyde says "We do not recommend that Dragon users use the *Poke* because we cannot tell what long-term harm it will cause the machine It is not just the Dragon's processor which has been designed to run at 1MHz but the whole design of the computer The peripheral interface adaptor which communicates with the keyboard and parts of the Ram have also been designed to work best at less than 1MHz

Paintinga by numbers

KOALA Painter from Audiogenic is a graphics tablet for the Commodore 64 Consisting of a tablet and stylus, disc-based software and manual, it enables users to draw directly on to the screen

There are facilities for selecting colour, creating mirror images copying one part of a picture to another and erasing mistakes The user can choose between eight brush sizes and 16 colours

Koala Painter costs £89 95 including VAT from Audiogenic, PO Box 88, Reading Berks RG1 2SN

Little new at ZX fair

THE eleven and a half thousand visitors to the 9th ZX Microfair on December 3 and 4 found little new hardware or software on display

Apart from East London Robotics' demonstration of its revolutionary new Trick-Stick Spectrum joystick, interest once again centred around new Spectrum software

Richard Shepherd showed a new adventure by Invincible Island *author Peter Cooke* – Urban Upstart

Silversoft, which has been rather quiet in recent months, had three new titles — Frece' Bees, Robot Riot and Sam Spade

Microsphere displayed a new 48K game Wheelie

Adventure house Phipps Associates launched its first arcade titles – House of the Living Dead Killer Knight, and Loony Zoo

And Gilsoft offered a new adventure written using its games-designer program The Quill — Magic Castle

One trend that is very noticeable with recent shows is that increasingly the Microfairs are becoming dominated by retail exhibitors More and more software shops are attending with fewer and fewer of the software houses choosing to show

Rotten apples

APPLE, continuing its fight against counterfeit 'rotten Apples, last week failed in an attempt to ban the sale of Taiwanese-made copies of its Apple II in Australia

An Australian court ruled that the two machines — the Apple II and The Wombat — were clearly distinguishable by their names and that the Wombat distributor was not guilty of misrepresentation

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OF THE MUTANT CAMELS

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BY JEFF MINTER FROM LLAMASOFT

£7.50



Llamasoft

US Viking for Dragon



DRAGON has continued to follow its American software path with the launch of seven Dragon 32 titles, all previously available in the US for the Tandy Color Computer

The licences have been agreed by Dragon with a number of US Tandy houses — Softlaw Corporation (Cimeeon Moon), Computer ware (Bloc Head and Synther 7), Prickly Pear (Viking, Shaft and Tee Off) and Spectral Associates (Whirlybird Run)

"We have had to go to the States because the 6809 chip around which the Dragon is based has been rather neglected in the UK. Good software in this country is either written for the Z80 or 6502 processor," commented Dragon's Clive Johnson

Pricing of the new titles is related to the level of royalty payment Dragon has agreed for the titles. Whirlybird Run from Spectral Associates costs as much as £12 95 for a single cassette title

"It is difficult to get in contact with good individual writers and by going to established US software houses we can tap into their authors," said Clive

At present there are no plans for any of the American companies to write material specially for the Dragon "It wouldn't be worth their while, when they can write for both the Dragon and Tandy machines at once " he added

Teddy bear's picnic

AS Imagine's Ah Diddums and Audiogenic's Teddy bears are in vogue

After Christmas Artic programmer John Ritman — author of 3D Combat Zone — will continue the trend with Bear Bovver his new game for the 48K Spectrum

As Ted the bear you must leave the security of your electric car and climb a series of ladders to drop down a new set of batteries for it. In so doing it is important to avoid the bovver bears and their strange-looking pet

John says "It's a tactical arcade game. You can either run straight for the batteries and try to get through as many screens as you can or you can deliberately try to group the bears on a battery when you drop it — you get really high scores for that

Byting back

MICRO Format is offering a useful new type of add-on – the Byte Bat

The 17 inch long foam rubber baseball bat is ideal for those occasions when you just cannot stand it any more – and wish to take out your programming frustrations on your micro

More details from Micro Format, 1271 West Dundee Road, Suite 16A, Buffalo Grove, Illinois 60090, USA. The Byte Bat costs $9 95 (about £7) excluding postage and packing

IBM contract

AB Electronics, manufacturer of Acorn's BBC and Electron micros, has won a multi-million pound contract to supply parts for the IBM Personal Computer

IBM refused to disclose details of the contract, but AB admitted it was its biggest deal yet. Some indication of the size of the contract can be seen from AB's turnover — nearly £40m this year

Business and accounts

GEMINI has announced a range of software titles for serious micro users

The five packages provide home business, accounting, and mail handling programs

Combination Home Pack 1 contains *Database, Home Accounts, Mailist, Spreadsheet Analysis* and *Graphplot* for the Electron (on cassette) and BBC (on cassette, 40- or 80-track disc) machines priced at £79 95

Combination Home Pack 2 contains *Database, Home Accounts, Graphplot* and *Mailist* for the 48K Spectrum (on cassette) priced at £59 95

The other three titles are *Combination Business Packs 1 to 3*, the first two for the BBC machine and the last for the Electron, featuring more advanced versions of the programs in the *Combination Home Packs*

From February 1 the complete range of business and utility programs will be available for the Commodore 64 computer

Details from Gemini Marketing, 18a Littleham Road, Exmouth, Devon

Mattel shows no improvement

MATTEL, the US toy and video game giant, is continuing to show big losses

Despite dropping its Aquarius microcomputer and announcing its intention to withdraw completely from the highly competitive home computer market, Mattel has recorded a substantial third quarter loss of $46 3m. A healthy profit in its toy division was more than cancelled out by an $82 4m loss in its electronics and computer division

Storage solution

For those of us lucky enough to own a Sinclair Microdrive, there is the slight problem of the storage of cartridges which are about 1/8 the size of the ugly old tape cassettes.

My suggestion is to use the lid (the clear plastic half) of an empty cassette box. After all we have plenty of spare tapes now we can store so much on a tiny cartridge.

Stand the cassette box lid on its edge to form a tray with a high back and stand your Microdrive cartridges in it. The lid will stand on a working surface or the back can be glued to the edge of a shelf. Leave the insert sheet in for an index record.

Yours, one of the chosen few

Vic Philips
17 Elizabeth Avenue
Ibstock
Leicester

Computer loonie

I would like to know if anyone could help out a poor old computer loonie. I want a *Phoenix*-type game for the Commodore 64 — it must have the full five screens.

Can anyone help before I crack up? Could you also let me know the company etc. Help!

Mark Roebuck
59 Ings Walk
South Kirkby
Pontefract
W Yorkshire

I am afraid that I don't know of any *Phoenix* games for the Commodore 64, but I am sure they must exist. Perhaps our readers will be able to supply some details.

Ace club

Re Phil Murrey's letter of December 1. The Jupiter Ace Users Club is alive and well, has over 350 members, and is just about to issue its fourth newsletter. We welcome new members and suggest Phil writes to us. Subscription is £7 for 1984. Newsletters 1-4 cost an additional £7. Cheques payable 'Remsoft'. Here endeth the commercial.

Now that Jupiter have gone down the plughole, it's even more necessary for Ace users to stick together and share information.

By the way, the new Forth computer from Microkey is set for launch in January. It doesn't replace the Ace, merely complements it (128K, 3½" Sony drives, good keyboard interfaces, etc ...).

John Noyce
Remsoft
18 George Street
Brighton BN2 1RH

PS Yes I've met the theoretical ideal language types (re Jeremy Ruston's article). They're a pain. Forth is a lot more versatile than people give it credit. But even so, it's horses for courses.

Microdrive problems

Andrew Pennell and friend are not the only people to have experienced difficulties with the new Sinclair Interface 1 and Microdrive. In my own case both worked perfectly, with no sign of any problems until a month had passed. At that point I'd either get a syntax error when attempting to initiate a Microdrive *Save* or *Load* command into the computer directly or a 'Nonsense in Basic' message when trying from within a program.

Sinclair have now replaced my Interface 1 (no 121) with another issue 2 (no 422). Unfortunately, I haven't really been able to check whether this works correctly as last week my Spectrum gave up the ghost after I plugged in Interface 2!

What concerns me about the whole situation is that we Spectrum Issue 1 owners have waited over a year for the much promised Microdrive. Are we now to discover that the useful life of a Spectrum is only just longer than that period?

Ian Maule
5 Beaconsfield Road
New Malden
Surrey KT3 3HY

Any truth in the rumours about Rupert Murdoch and Warner Communications?

Rom omission

Thank you for forwarding Gareth Rowland's letter as it highlighted an omission in my article in the 20-26 October issue on making Rom calls. There should be eight steps, not seven! If *step 3.5* "*STX >$A6*" is not included the technique will not work. I apologise for the frustration this will have caused people. The eight steps should be as follows:

```
1) Create tokenised BASIC
   line
2) LDX >$A6  PSHS X
3) LEAX BLINENAME PCR
4) STX >$A6 -missing step
5) LDA ,X
6) ANDCC #$FE
7) JSR 12345 (or whichever)
8) PULS X  STX >$A6
```

Peter Whittaker
Cambridge

Interrupt mistake

With regard to the use of interrupts on the Spectrum by Alan Went (*PCW* 24-30 November).

The general article was very interesting but he made a basic mistake in assuming that during the interrupt acknowledge cycle the data bus would contain 255 decimal. Although the data received will normally be 255, this is not always true. The actual value can be anywhere between 0 and 255, the problem being that some add on units do not decode the *Ioreq* and *Read* lines correctly.

Also, there are no true pull up resistors on the data bus which rely on the pull up effect of the memory devices, etc to ensure 255 — this cannot be guaranteed to work.

To ensure that the interrupt will respond as required, it is necessary for it to work no matter what value is returned. To do this, we must set aside 257 bytes for an interrupt vector table. Each byte of this table contains the same value such that no matter what value is added to the *I* register we always jump to the correct address (257 bytes are needed, as the first byte of the vector address could be at the 256th byte ie returns 255).

In my 48K Spectrum I use *Feh* (254 dec) as the value stored in the table. This means that the interrupt address is at *Fefeh* (65278 dec). The vector table is placed at address *Fdooh* to *Feooh* (64768 to 65024 dec).

The use of the *I* register at *FDH* does not cause any 'snow' on the screen, as this only happens between *40H* and *7FH*, the memory for the 16K Spectrum. But this does cause problems for 16K owners who are unable to use this technique. The accompanying brief routine will set up the interrupt.

Anyway, thanks for an interesting magazine, keep up the good work.

D Allday
Lyons
Rusper Road
Ifield
Crawley
Sussex RH11 0LR

Address	Data	Code	Remarks
FE56	F3	ON DI	;ensure interrupt does ;not occur during change
FE57	2100FD	LD HL,0FD00H	;set table
FE5A	0600	LD B,0	
FE5C	36FE	LOOP LD (HL),0FEH	
FE5E	23	INC HL	
FE5F	10FB	DJNZ LOOP	
FE61	3EFD	LD A,0FDH	;set I register
FE63	ED47	LD I,A	
FE65	ED5E	IM 2	;Set interrupt mode
FE67	FB	EI	
FE68	C9	RET	
FE69	ED56	OFF IM 1	;turn off special
FE6B	C9	RET	; reset to orig mode (no need to reset I reg.)
FEFE	Interrupt routine starts here.		

Abandon Earth

A new game for the unexpanded Vic20 by Mark Manne

As the last remaining computer on the remains of the planet Earth, after the great galactic battle of 2056 AD it is your job to get the last remaining scientists (4) to the awaiting mother ship. But it's not as easy as it seems. Not only does the mother ship move from left to right across the top of the screen, but there are also asteroids, aliens and space mines to stop your progress.

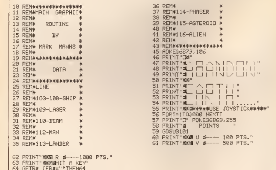
This game for the unexpanded Vic20 loads in two parts. The first part contains the instructions and the data for the graphics. The second part contains the main program. (This game uses joystick.)

Variables

TI	—TIME
SC	—SCORE
LI	—LIVES
COL	—COLOUR
BP	—FIRE
BC	—FIRE
M	—MOVE MOTHER SHIP

Program notes

0-10	VARIABLES
10-18	MAIN ROUTINES
90-1007	SET UP SCREEN
3000-4050	LAUNCH MEN
6000-6018	JOYSTICK CONTROL
8000-8007	FIRE
10000-10006	MOVE MOTHER SHIP
20000-20011	ENDING ROUTINE
29999-30010	DETECTION + SCORING



```
10 REM****************
11 REM*MAIN  GRAPHIC*
12 REM*              *
13 REM*   ROUTINE    *
14 REM*              *
15 REM*     BY       *
16 REM*              *
17 REM* MARK  MANNS  *
18 REM*              *
19 REM****************
20 REM*              *
21 REM*     DATA     *
23 REM*              *
24 REM****************
25 REM*LINE          *
26 REM*              *
27 REM*103-100-SHIP  *
28 REM*              *
29 REM*109-LASER     *
30 REM*              *
31 REM*110-BEAM      *
32 REM*              *
33 REM*112-MAN       *
34 REM*              *
35 REM*113-LANDER    *
36 REM*              *
37 REM*114-PHASER    *
38 REM*              *
39 REM*115-ASTEROID  *
40 REM*              *
41 REM*116-ALIEN     *
42 REM*              *
43 REM****************
45 POKE36873,106
46 PRINT"ℷ■"
47 PRINT"■` ⊓ ∧ N I ⊓ ⊓ I I"
48 PRINT"■└┘ ⊓ └┘ I I I I I I I"
49 PRINT"■ I └┘ I I I N └/ └┘ I N"
50 PRINT"■■"
51 PRINT"■‾ ∧ ⊓ T I I"
52 PRINT"■└ └┘ └┘ I I I"
53 PRINT"■ I I N I ⊓"
54 PRINT"■└ I I I \ I I I......"
55 PRINT"■■■****USE JOYSTICK*****"
56 FORT=1TO2000 NEXTT
57 PRINT"ℷ" POKE36869,255
58 PRINT"■   POINTS    "
59 GOSUB101
60 PRINT"■■ U ■--- 100 PTS."
61 PRINT"■■ V ■--- 500 PTS."
62 PRINT"■■ R ■----1000 PTS."
63 PRINT"■■■HIT A KEY"
64 GETR$ IFR$=""THEN64
65 PRINT"ℷ"
66 POKE36869,240
67 PRINT"■YOU MUST EVACUATE THE LAST REMAINING"
68 PRINT"NUCLEAR PHYSICIST FROM EARTH,"
69 PRINT"TO AN AWAITING          SPACESHIP"
70 PRINT"BUT DUE TO THE GLACTIC WAR BETWEEN ALPHA    CENTURI AND THE TERRANS"
71 PRINT"LARGE ASTEROIDS AND   SPACE MINES BLOCK YOUR PROGRESS"
72 PRINT"■WATCH OUT, THE          CENTURIANS HAVE HIRED ALIENS"
73 PRINT"TO EAT YOUR MEN AS YOU FIRE THEM OUT INTO   SPACE."
74 FORT=1TO9000 NEXTT
75 PRINT"ℷ"
76 PRINT"■■***CONTROLE****"
78 PRINT"■■YOU CONTROL THE       LAUCHER AT THE BOTTOM OF THE SCREEN"
```

```
79 PRINT"YOU CAN FIRE USING THE RED BUTTON"
80 PRINT"BUT WATCH OUT THE      LAUCHER USES THE     LATEST"
81 PRINT"ANTI-MATTER BEAMS     WITCH PASS  THROUGH   THERE TARGET TO HIT   MORE
"
82 PRINT"TO LAUCH  ONE OF THE  FOUR SCIENTIST PULL   BACK ON THE JOYSTICK"
88 FOPT=1TO8000 NEXTT
99 GOTO121
101 POKE56,28 POKE52,28
102 FOPT=7168TO7168+184 READA POKET,A NEXT
103 DATA0,0,0,0,0,1,3,7,0,0,0,0,0,255,255,255
104 DATA1,3,15,15,255,255,255,255,128,192,240,240,255,255,255,255
105 DATA0 0,0,0,0,128,192,224,15,31,63,255,31,31,15,15,255,60,60,255,255,255,25
5,255
106 DATA255,204,204,255,255,255,255,255,240,248,252,255,248,248,240,240,7,7,3,3
1,1,0,0
107 DATA192,192,128,128,128,0,0,0,7,7,7,0,0,0,0,0,224,224,224,0,0,0,0,0
108 DATA3,3,1,1,0,0,0,0,224,224,192,192,128,126,0,0
109 DATA0,42,42,255,42,42,0,0,0,84,84,255,84,84,0,0
110 DATA34,85,85,149,0,0,0,0
112 DATA0,26,28,8,62,8,20,34
113 DATA0,24,24,36,66,255,255,54
114 DATA0,0,16,16,16,16,0,0,0
115 DATA56 126,255,126,254,248,60,8
116 DATA126,90,255,189,189,36,66,36
120 FORI=7424TO7431 POKEI,0 NEXT RETURN
121 PRINT"LOAD "
160 FOKE198,3 POKE632,19 POKE633,13 POKE634,13

0 REM****VARIBLES****
1 A$="" X=10 CR=25 LI=4 ZX=20
2 D$="" V=0 M=0 TI$="000000" COL=30720 SC=0 YT=0 GG=0 S=0
10 REM****MAIN ROUTINE****
11 GOSUB100
15 GOSUB6000
16 GOSUB10000
17 IFV=1THENM=M-1 GOSUB10000
18 IFV=2THENM=M+1 GOSUB10000
20 PRINT"TIME ",FIGHT$(TI$,3)
21 PRINTTAB(10)"SCORE ",SC
29 REM****SET UP PHASES****
30 IFTI$>"000199"THEN60000
40 IFTI$="000100"THENPOKE36879,8 ZX=10 S=1
41 IFTI$="000125"THENPOKE36879,42 ZX=5
42 IFTI$="000145"THENPOKE36879,27 S=0 ZX=20
43 IFTI$="000155"THENPOKE36879,93 ZX=5 S=0
50 GOTO15
99 REM****SET UP SCREEN****
100 FOKE36869,255 POKE36879,CR
1000 PRINT"" FORT=8164TO8185 POKET,230 POKECOL,230 POKET+COL,6 NEXT
1002 DEFFNR(X)=INT(RND(1)*X+1) FORI=1TO50 A=FNR(395)+7702
1003 POKEA,174 POKEA+30720,FNR(6) NEXT
1040 PRINTA$TAB(11)"S"
1045 FORI=1TO20 A=FNR(40)+7834 POKEA,171 POKEA+COL,FNR(6) NEXT
1050 FORI=1TO35 A=FNR(100)+7966 POKEA,21 POKEA+COL,INT(RND(3)*8) NEXT
1052 FORI=1TOINT(RND(1)*20) A=FNR(40)+7834 POKEA,22
1053 POKEA+COL,FNR(6) NEXT
1055 PRINT"\"
1056 PRINT"\"
1057 IFLI=4THENPRINT"RR PR " RETURN
1059 IFLI=3THENPRINT"R PR "
1061 IFLI=2THENPRINT"  PR "
1063 IFLI=1THENPRINT"  R "
1065 IFLI=0THENPRINT"   ";
1067 GOTO4000
1070 AA$="ALL YOUR MEN HAVE GONE" GOTO20000
1080 END
2000 AA$="YOU HIT YOUR SHIP     SO IT FIRED BACK."
2001 GOTO20000
```


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```
3999 PEM****LAUNCH MEN****
4000 IFYT/4THEN1070
4004 MI=6120+Y+1 NI=MI+COL
4005 GOSUB10000
4006 GOSUB30004
4007 POKEMI,Q POKENI,0
4009 MH=5 GOSUB6000 MH=0 POKEMI,32
4011 MI=MI-44 NI=NI-44 IFMI<7768THENRETURN
4012 GOTO4005
4050 END
6000 REM****JOYSTICK****
6001 POKE37137,0 POKE37154,127
6002 U1=PEEK(37137) U2=PEEK(37152)
6003 IF(U1AND4)=0ANDMH<>5THENYT=YT+1 LI=LI-1 Q=18 GOTO1055
6008 IF(U2AND128)=0ANDX<16THENX=X+1 GOTO6500
6010 IF(U1AND16)=0ANDX>3THENX=X-1 GOTO6500
6013 IF(U1AND32)=0ANDGH<>5THEN6000
6016 RETURN
6500 PRINTA$,TAB(X)" S "
6509 RETURN
6900 POKEBP,8 POKEBC,10 POKE36877,190  FORI=15TO0STEP-.2
6901 POKE36878,I+144 NEXT POKE36877,0 POKE36878,6 POKEBP,32
6909 RETURN
7999 END
8000 FEM****FIRE****
8001 BP=2120+X+1 BC=BP+30720
8002 GOSUB30000
8003 POKEBP,20 POKEBC,S
8005 GH=5 GOSUB6900 GH=0 POKEBP,32
8006 BP=BP-44 BC=BC-44  IFBP<7702THENRETURN
8007 GOTO8002
9900 REM
10000 REM***MOVE MOTHER SHIP***
10001 PRINTD$,TAB(M)" @ABCAD ■■■■■■■■■ EFGGFH ■■■■■■■■■ IJKLMN "
10002 FORT=1TOZX
10003 IFM<1THENV=2
10004 IFM>14THENV=1
10005 POKE36878,15 POKE36876,220 FORL=1TO5 NEXTL POKE36876,0 POKE36878,0
10006 RETURN END
20000 POKE36878,15 FORXX=15TO0STEP-3 POKE36880,RND(1)*3+11 POKE36881,RND(1)*2+3

20001 POKE36877,160+XX FORDE=1TO10 NEXTDE,XX POKE36877,0
20010 PRINT"■■" POKE36878,8
20011 GOTO40000
28888 END
29999 REM**SCREEN DETECTION**
30000 IFPEEK(BP)=21THENSC=SC+100 GOTO6900
30001 IFPEEK(BP)=171THENAA$="■■■YOU HIT A MINE" GOTO20000
30002 IFPEEK(BP)=12ORPEEK(BP)=13ORPEEK(BP)=14THEN2000
30003 IFPEEK(BP)=22THENSC=SC+10 GOTO6900
30004 IFPEEK(MI)=9ORPEEK(MI)=10ORPEEK(MI)=11THENSC=SC+1000 GG=GG+1 GOTO6000
30005 IFPEEK(MI)=12ORPEEK(MI)=13THENSC=SC+1000 GG=GG+1 GOTO6000
30006 IFPEEK(MI)=21THENSC=SC-100 Q=32 RETURN
30007 IFPEEK(BP)=11ORPEEK(BP)=10ORPEEK(BP)=9THEN2000
30008 IFPEEK(MI)=171THENQ=32 AA$="■■■YOU HIT A MINE" GOTO20000
30009 IFPEEK(MI)=22THENQ=32 SC=SC-1000 RETURN
30010 RETURN
39999 REM****END ROUTINES****
40000 REM
40001 POKE36869,240 POKE36879,8 PRINT"■■"
40002 PRINTAA$
40003 PRINT"■■■BUT YOU GOT " GG, PRINT"OF YOUR■4 MEN SAFTLY OUT"
40004 PRINT"■■AND SCORED",SC, PRINT" PTS."
40005 PRINT"■■■IN A TIME OF ",RIGHT$(TI$,3)
40008 FORT=1TO5000 NEXTT PRINT"■"
40010 POKE36879,27
40011 END
60000 AA$="YOUR TIME IS UP" GOTO20000
```

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The legend continues

***Graham Taylor** looks at the men behind* Valhalla *– a Norse legend brought to life*

To date Legend Software has released one game — a game that depending on which chart you believe has occupied one of the top five positions since the day of its release and looks set to remain there all Christmas and beyond The game is *Valhalla*.

For a game which is doing so well, surprisingly little has been heard about the company But, romantics who like stories of 12-year-old whizz kids are going to be disappointed *Valhalla* is the end result of nearly nine months of coding by a team of seven, the majority of whom are very experienced programmers

The almost military operation was masterminded by managing director John Peel. The idea that we should do an animated graphics adventure goes back nearly two years It really is the first logical step on the way to an interactive movie — something indistinguishable from a real film except that you are one of the characters

The idea of interactive movies is pretty dramatic We wanted a name for the company that would imply something romantic and grandiose — the name Legend was no accident we spent days ploughing through dictionaries '

Valhalla has graphics and characters loosely based on Norse myth Backgrounds depict forests castles caves and lakes and the characters are dressed with helmets and armour — as is appropriate to the theme

In fact, though such details were not decided until a very late stage of development "They are incidentals really We had outlined several different plots and *Valhalla* happened to be first. Once the Movisoft operating system was functional aspects like shapes of character and types of background were mere detail

It s Movisoft that ensures that *Valhalla* will be no one off "Timing for *Val II* is less a matter of coding and more a question of market timing Once demand for *Valhalla* has calmed down a bit and is ticking over we ll issue it — I think we re looking at next spring

Needless to say *Val II* will not be called *Val II* but John would give away few details about it It won t be staggeringly different but it will definitely be an improvement — we ve learnt a lot from *Valhalla*

John Peel has been involved in computer software for quite a while He started Premier Publications, which later became Premier Microsystems — now familiar for a Dragon disc drive He sold that company to set up another one familiar to Spectrum owners Microl

Microl was an idea waiting for a computer When the Spectrum was announced we were ready — the first product, *Use and Learn* came out within days of the computer

Microl was successful in an unspectacular way and became the means of financing *Valhalla* The cost of *Valhalla* was at least £70 000 with all the development work and other outgoings We were committed to selling a lot of programs to break even

VALHALLA

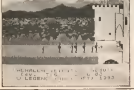
The company has already recouped its costs and more 'I m afraid we have bought the obligatory black Turbo Porsche but the rest will be ploughed back into other projects

Legend will be licencing Movisoft to other companies The hope is that it will become the adventure game equivalent of CP/M — so standard that many computer manufacturers will allow for its easy implementation on their new machines

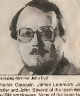
' What s important is the size of memory — 48K is more or less mandatory — but I don t anticipate many new machines having less than that

"Movisoft is not really specific to the Spectrum s Z80 processor at all We did it on that machine simply because we could and it has sold the most adds John

This is borne out by the fact that *Valhalla* will be issued on the Commodore 64 in February The Commodore 64 version of the game will be similar to the Spectrum one but obviously the graphics will be better For one thing the characters will be more than one colour and we should also be able to do more with the backgrounds



The team responsible for *Valhalla* was Graham Asher Richard Edwards Charles Goodwin James Learmont Jan Ostler and John Several of the team were ex-IBM employees None of the team had ever played a computer adventure before starting on the project although some were *Dungeons and Dragons* fans



Managing director John Peel

Jan Ostler was responsible for many of the overall themes and ideas and, particularly the characterisation ' The first thing I did when work began in earnest was to buy every adventure game I could lay my hands on — I spent a fortune

I was amazed at the lack of professionalism — most of them were full of spelling mistakes and obvious bugs — the only exception was *The Hobbit*

John agreed I was sufficiently impressed to have a technical analysis done on it — the gist of that was well yes but we can do better

If we have done better I think it s down to working as a team giving people different and separate responsibilities It s really impossible to do a big project like this any other way — take the analogy with conventional movies Imagine one person being not only the cameraman and the director but also having to design his own camera

The success of that design can be seen in the number of technical achievements in *Valhalla* Two aspects are particularly interesting — the seeming independance of the characters and their ability to continue with what they are doing not only as you watch, but even when you are typing in commands

VALHALLA

The character independence was achieved by a technique known in artificial intelligence circles as fuzzy logic This involves a deliberate smearing of fixed patterns using random processes Put simply, instead of saying under condition *X* Character *Y* will do *Z* the situation is changed so that *Y* might not do *Z* under condition *X* although the character probably will

Actually it s nothing like as simple as sticking in a random number from time to time Rather there are multiple levels of generators controlling the events some are predictable, others are not — we control how they interact

The way action and input can occur at the same time — a technique known as concurrency — is less easy to explain

Apparently the concurrency is achieved by using vectored interrupts in conjunction with registers and stack 'lookaside' copies said John Now you know

In keeping with its name, Legend s plans for the future are dramatic and grandiose "We re waiting for the hardware to a certain extent to get the kind of graphics we want to do, we need a lot more memory

"We re also interested in the idea of speech Quite honestly, the only thing stopping anyone from having a speech unit with decent human-like speech is that no one has got round to designing a new chip — everyone is still using the Texas chip that's why they all sound like Daleks

Another area that interests Legend is speech recognition 'It s not that difficult to get a computer to recognise speech, but it s difficult to do it under normal conditions ie when everyone shouts at once

Assuming these problems are solved John is very enthusiastic about the outcome With plenty of memory plus good speech, plus speech recognition, there is no reason why there should not be a program visually indistinguishable from a tv picture with characters whom you can speak to and who will answer back — the potential market is enormous '

John actually sees a day in which there will be something like a video library, with all sorts of different interactive movies on all sorts of themes which people hire for the evening You could have just as many themes as normal videos — cowboys, horror science fiction and so on

"A whole new kind of artistic talent might develop — if we can make Movisoft simple enough to operate so that only a small amount of actual programming knowledge is necessary, then creative people could use the system to design plots and characters like a scriptwriter or a director "

So far as the future is concerned John doubts that many of the micros being launched now will survive "There are some nice machines, but quite honestly I don t see how they are going to survive — in this country Sinclair and Commodore have got it sewn up — or at least they have if they choose to play rough I don t think we ll see more than three or four manufacturers survive in the next few years — then we ll see the kind of standardisation under which systems like Movisoft can flourish

Some of the lessons learnt from *Valhalla* will bear fruit in non-adventuring areas, says Jan 'There is no sensible reason why computers should be the province of males between 15 and 35, but people just haven t discovered how to write programs for women We have something planned that will help to change that situation

Legend are giving little away but it seems such a project would involve some of the artificial intelligence techniques used in *Valhalla* to an even more sophisticated degree

Legend seems a peculiar mixture of daydreamers who ve proved their dreams are at least partly possible and fairly hard-bitten realists playing close attention to the market and its requirements It may be that this mixture was a vital part of the success of the project

John Peel sums up *Valhalla* in the following way "I would call it a qualified success — certainly we ve proved that a number of things are possible on a cheap home computer that everybody said were impossible More than that I think we ve introduced the basic concept to people Naturally there are a lot of things I would change about *Valhalla*, things which could have been done better even on a Spectrum — wait until the next one ■

In the driving seat

***Graham Taylor** looks at three games designers and compares the results*

Does the following pattern sound familiar? You buy a computer after months of planning and saving For a while you play with it avidly you even learn a reasonable amount of Basic programming There follows a period of increasing disenchantment as you realise that your own programs are never likely to reach the standards of the top software houses — gradually your computer gets left on the shelf more and more, a sad, lonely sight

What we all hope to get from having a computer is a kind of technological Lego — an endlessly changeable toy The problem is that just buying commercial programs doesn't bring the satisfaction of creating them yourself

If this does sound familiar then now is the time to bring out your machine from the top shelf and dust it down The fun may come back to computing — the games designers have arrived

These packages allow you to create your own games using various kinds of menus or special languages The result is a far more professional game that is faster than anything written in Basic The price you pay is some degree of restriction in the kinds of game you can create

Although the packages reviewed here are predominantly Spectrum based you can expect to see similar programs being made available for other machines shortly

To begin with though, *CoCo II*, a program for the Vic20 that's been around for quite a while, but hasn't been distributed widely in this country

You design your game in two distinct sections — *Player* and *Opponent* Within each section you use a simple Basic like, language to determine the pattern of movement and the score values Movement is by a minimum of four pixels at a time which means that the end result is bound to be fairly jerky

The language is easy to use the eight points of the compass are assigned numbers, with one extra number for 'track', ie for the opponent and player to follow one another Movement is then a matter of a series of commands like *Move 1 5 Move 4 12* etc meaning *SW* for 5, 4 pixel units, then *W* for 12 units

Shapes are designed using a simple user-defined graphics generator, operated by joystick — you just fire to turn a pixel on or off The program comes with an extensive manual and one sample game which, unfortunately doesn't really show the program off at its best

The problem with *CoCo II* is that the end results are rather disappointing — they are not really very much better than you could do with only a limited knowledge of Basic — the only exception to this being the ease with witch you can create shapes but then there are plenty of programs around to help you do that for far less money

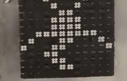
In terms of the quality of the end result *Games Designer* from Quicksilva is a far more impressive package The program comes with eight ready-made games any of which might have been marketed successfully in its own right in the early days of Spectrum games

The main reason for the quality of the games is the provision of a sprite generator within the program — independent graphic shapes whose movements can be individually defined Sprite movement is smooth and fast and is the basis for most arcade machines Using simple cursor controls any shape may be assigned up to 32 sprites, as may any colour

Any of four game formats can be selected — *Invaders, Defender, Asteroids* or *Beserk* type The difference between the game lies in the screen layout and the position and manoeuvradility of the missile base/spaceship, eg, *Invaders* format gives you a base at the bottom of the screen with waves of aliens attacking from the top and base movement limited to left and right In *Asteroids* format, the spaceship is placed centre screen with the enemy swirling around it — the base can move in all directions

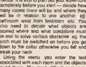
Using a series of menu options, sounds can be assigned to shapes using a simple but effective sound generator The movement and attack waves are selected — ie how many aliens move where and at what time Movement is almost infinitely variable and is programmed in a similar way to *CoCo* with numbers assigned to directions A line display shows you the pattern of movement you are creating

Other options on the menu allow for a star background and optional features like whether or not your ship has a shield You may also select which if any, of your waves of attackers are able to fire back at you









One of the most impressive features of the *Games Designer* is the animation of the aliens. By designing two appropriate sprites, a menu option allows you to switch quickly between them — thus, space invaders can wave their arms threateningly, or spheres can appear to spin.

If you like fairly straightforward alien bashing then *Games Designer* is for you — you really can create games as good as those available commercially, but to your own specifications. The only criticism I would make is that you really don't have much choice over the basic structure of each game, since you must adopt one of the four predetermined formats.

As proof that the idea of programs for creating games aren't limited to arcade-style games, Gilsoft have now released *The Quill* — a program for constructing text adventures.

To use *The Quill* properly requires some effort and some experience — it is absolutely essential to go through the examples in the manual. But, although it requires the most effort to get a tangible result, *The Quill* is perhaps the most satisfying of all the programs mentioned.

The program again works by the use of menus. It is vital to plan out your adventure completely before you start — decide how many rooms there will be and where they will be in relation to one another, eg bathroom west from bedroom etc. You also need to decide what objects are located where and what conditions must be met to solve various obstacles, eg the torch must be switched on before you go down to the cellar otherwise you fall and break your neck.

Using the menu you enter the text associated with each room and the objects found there. The most difficult section is the list of acceptable verbs, this includes not only those vital to the plot, eg, '*Kill vicious monster*' but other inputs to which you want the game to respond with something other than 'I don't understand.'

The crux of this input response is the use of flags — put simply these are 29 on/off switches used to determine various courses of action, eg you may decide that flag 15 is set on when someone picks up the screwdriver. Later on, opening a safe may depend on whether or not you have the screwdriver, ie, is the flag set or not? It's not difficult to use but it does require logical thought, particularly if you want to create brain-teasing puzzles in the game.

For an adventure fan, possibly the only thing more satisfying than solving puzzles is creating your own and watching someone else trying to solve them — particularly when you can populate your adventure with people and places known to those likely to try and solve it. Gilsoft will even let you market your *Quill*-written adventure — they only ask for a mention. *Quill* supplies the programming (in machine code), all you have to provide is some thought, planning and perseverance.

Despite the odd reservation, all these packages can be recommended. They might breathe new life into your micro merely by putting you back in the driving seat and letting you find out what you can do. ■

Firm	Program	Cost
Gilsoft 30 Hawthorn Road Barry South Glamorgan CF6 8LE	*The Quill*	£14.95
Games Designer Software Studios Quicksilva 13 Palmerston Road Southampton Hampshire	*Games Designer*	£14.95
Mapsoft (Distributors) Unit A Oak Road South Hadleigh Benfleet Essex SS7 2BB	*CoCo 2*	£19.25



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VALHALLA

One hundred and eighty

Andy Wilson concludes his series on structured programming for the ZX81

Last week we looked at assembly language I now hope to give a few more tips on using the routines

As the procedures must be defined before they are called it is best to have all the procedure definitions at the beginning of the program Alternatively you could throw your scruples to the wind and use a *Gosub*, with the definitions at the end of the program

Procedures can be called from within other procedures, or even iteratively, ie a procedure can call itself, but keep one eye on the procedure stack!

One of the shortcomings of the routines is that parameters cannot be passed to and from procedures We can, however, simulate this facility in the same way we might when using *Gosubs*, eg

```
500 LET X = Y
510 LET XFACTORIAL = USR CALLPROC
520 LET Y = X
```

With an appropriate procedure *XFactorial* this will work out the factorial of *Y*, or any other variable we may wish to use

Listing 7 is an example of a full program written using the routines It is supposed to simulate the electronic darts scoreboards often seen in pubs It has the advantage that the score of each dart can be entered individually, with a constant display of the running scores and the current thrower's round score and score needed to finish

You will I hope notice the total absence of the dreaded *Gotos* and *Gosubs* You will also in all probability notice the lack of the explanatory REMs whose virtues I extolled earlier This is a deliberate move intended to show how easy it can be to follow the gist of a reasonably structured program

Although I have not used REMs to actually explain the program, I have used them to help clarify the structure REMs followed by a line or more of spaces are used to separate parts of the program, while REMs followed by graphic shifted 7s are used to underline procedure names

The program was written 'top down' that is the outline of what procedures would be needed, and how they would relate to each other, was decided before any actual code was written Naturally this outline has often changed by the time a program is complete but this method still helps make it easier to understand You should get a rough idea of how the program works simply by looking at the procedure names and where they are called

Nevertheless, I expect some explanation of the program would not go amiss If you intend to type in the program I suggest you do so first after *Loading* the machine code of course, then *Run* it. This should make things much clearer

I will give a brief explanation of each procedure, in reverse order, starting with

Intro I hope you can guess what this does Called by the main program

Scrollup as the name suggests scrolls the screen up one line, keeping the current print line the same The top line T$ is reprinted so we don't lose it Note the *Print* after *Scroll* to avoid upsetting the display Called by *Play*

Dartin checks the score entered is in fact a possible dart throw and sees if it is a double or treble Called by *ScoreIn*

ScoreIn inputs the score and converts it from a string to an integer Called by *Round*

Round gives a player three throws adds each dart to the round score and takes it away from the score needed to win It then makes sure the player hasn't bust Called by *Play*

Play firstly looks at the print line to see if the screen needs scrolling It then plays a *Round* for each player If the player hasn't bust it updates the score and prints the new one Called by the main program

Win if a player's running score is 0 and his/her last dart was a double or a bull we call *Win* A polite message is printed, a note is taken of who won, I is set to 2 in order to leave the *For* loop, and the *Won* flag is set Called by *Round*

Main Program starts by calling the *Introduction* and setting up two strings for the headings and spaces The rest of the program is repeated until the reply to the "*Play Again?* prompt is not Y" After initialising the variables and the screen we keep *Playing* until the *Won* flag is set

Presuming you know how to play darts that should have been quite easy to follow I hope you have found these articles interesting and maybe even useful If you were looking for tips on saving memory or speeding up your games you have read the wrong articles but if you've got this far you must have got something from them and any comments or even criticisms constructive of course would be very welcome

```
LISTING 7
=========

EXAMPLE PROGRAM
---------------

  10 REM **DARTS SCOREBOARD**
         ====================

  20 LET PLAY=USR DEFPROC
  25 REM
  30 LET LINE=LINE+1
  40 IF LINE=18 THEN LET SCROLLUP=USR CALLPROC
  50 FOR I=1 TO 2
  60 LET ROUND=USR CALLPROC
  70 LET S(I)=S(I)-(ROUNDSCORE AND NOT BUST)
  80 PRINT AT LINE,I*10,S(I)
  90 NEXT I
 100 RAND USR ENDPROC
 110 REM

 200 LET ROUND=USR DEFPROC
 205 REM
 210 LET ROUNDSCORE=0
 220 PRINT AT 19,0;"PLAYER ",I,'>'
 230 LET BUST=0
 240 LET DARTS=0
 250 RAND USR REPEAT
 255 PRINT AT 20,0,"YOU NEED ",TAB 4,S(I)-ROUNDSCORE," "
 260 LET DARTS=DARTS+1
 270 LET SCOREIN=USR CALLPROC
 280 PRINT AT 19,DARTS*4+8 D$
 290 LET ROUNDSCORE=ROUNDSCORE+DARTSCORE
 300 IF S(I)-ROUNDSCORE<2 THEN LET BUST=1
 310 IF S(I)-ROUNDSCORE=0 AND (MULT=2 OR DARTSCORE=50) THEN LET WIN=USR CALLPROC
 320 PRINT AT 19,26,(STR$ ROUNDSCORE) AND NOT BUST,"BUST" AND BUST AND NOT WON
 330 POKE UNTIL,DARTS=3 OR BUST
 340 RAND USR CHECK
 350 FOR F=1 TO 30
 360 NEXT F
 370 PRINT AT 19,0,S$,TAB 0,S$,TAB 0,S$
 380 RAND USR ENDPROC
 390 REM

 400 LET SCOREIN=USR DEFPROC
 405 REM
 410 [illegible]
 420 LET ERROR=0
 430 INPUT D$
 440 LET DARTIN=USR CALLPROC
 450 POKE UNTIL,NOT ERROR
 460 RAND USR CHECK
 470 LET DARTSCORE=VAL D$*MULT
 480 LET D$=C$+D$
 490 RAND USR ENDPROC
 495 REM

 500 LET DARTIN=USR DEFPROC
 505 REM
```

```
510 IF D$="" THEN LET D$="999"
520 LET MULT=1+(D$(1)="D")+2*(D
$(1)="T")
530 LET C$=D$(1) AND MULT>1
540 IF MULT>1 THEN LET D$=D$(2
TO )
550 FOR F=1 TO LEN D$
560 IF D$(F)<"0" OR D$(F)>"9" T
HEN LET ERROR=1
570 NEXT F
580 IF NOT ERROR THEN IF (VAL D
$>20 AND VAL D$<>25 AND VAL D$<>
50) OR (VAL D$>20 AND MULT>1) TH
EN LET ERROR=1
590 RAND USR ENDPROC
595 REM

600 LET WIN=USR DEFPROC
605 REM
610 PRINT AT 19,25,"YOU WON"
620 LET WINNER=I
630 LET I=2
640 LET WON=1
650 RAND USR ENDPROC
680 REM

700 LET SCROLLUP=USR DEFPROC
705 REM
710 SCROLL
720 PRINT TAB 31," "
730 LET LINE=17
740 PRINT AT 0,0;T$
750 RAND USR ENDPROC
760 REM

800 LET INTRO=USR DEFPROC
805 REM
810 PRINT TAB 8,"DARTS SCOREBOA
RD",TAB 8,"=================="
820 PRINT AT 5,0,"SCORES SHOULD
BE ENTERED IN THE FORM SHOWN BE
LOW,    E.G. -"
830 PRINT AT 8,0,"SINGLE 7","=
S7","DOUBLE 18","= D18","TRIPLE
20","= T20","OUTER BULL","= 25",
"BULSEYE","= 50"
840 PRINT AT 15,10,"PRESS A KEY
"
850 PAUSE 4E4
860 RAND USR ENDPROC
870 REM
1000 REM *MAIN PROG STARTS HERE*
         ========================

1005 LET INTRO=USR CALLPROC
1010 DIM S(2)
1020 LET S$="
                  "
1030 LET T$="         PLAYER 1  P
LAYER 2"
1040 RAND USR REPEAT
1050 CLS
1060 LET S(1)=501
1070 LET S(2)=501
1080 LET WON=0
1090 LET LINE=1
1100 PRINT AT 0,0,T$
1110 PRINT AT 1,10;S(1),TAB 20,S
(2)
1120 RAND USR REPEAT
1130 LET PLAY=USR CALLPROC
1140 POKE UNTIL,WON
1150 RAND USR CHECK
1160 PRINT AT LINE,WINNER*10,"WO
N"
1170 PRINT AT 21,0,"PLAY AGAIN ?
 (Y/N)"
1180 INPUT U$
1190 PRINT AT 21,0,S$
1200 POKE UNTIL,U$<>"Y"
1210 RAND USR CHECK
1250 STOP
1260 REM

9997 REM **AUTO-RUN**
         ============
9998 SAVE "DART█"
9999 RUN
```

One page at a time

Richard Walton presents a modified print routine for listing programs

The Dragon *List* routine is inconvenient if a long program is to be edited. Although *Shift @* can be used to stop the listing at any time, an automatic 'paging' of the listing is much more convenient.

The accompanying program provides such a facility. It does this by intercepting the Dragon's normal routine.

An assembler listing is provided to show how the routine works. In addition, a Basic program is given for users who do not have an assembler.

The program uses a number of useful addresses as follows.

H16A or 362: this is called by Basic whenever a key is pressed. The program intercepts this call. Normally this address contains a 57 code (*Rts*) but the program replaces this with a 126 code (*Jmp*).

H167 or 359: this is called whenever a character is printed. This is intercepted in the way described previously.

The Rom routine to get a character from the keyboard is also used. This is at address *41194*.

When the Basic program is Run, the machine code is *Poked* into reserved memory from address *32001*. The program contains a check on the Data statements and will stop if an error is found. The *Pokes* in lines 710 to 730 set up the interrupts which call the program.

The program can be called by pressing down-arrow key when required. A further pressing of the key returns to normal Basic print routine, which makes the running of programs more convenient.

When first entering and testing the program listing, leave out line 770 or you won't be able to alter it. ●

```
100 'IMPROVED DRAGON LISTING
110 'ROUTINE - R.WALTON.
120 '19/11/83
130 CLEAR 200,32000
140 FOR I=32001 TO 32008
150 READ A$:A$="&H"+A$
160 A=VAL(A$):POKE I,A
170 T=T+A
180 NEXT I
190 IF T<>439 THEN PRINT"DATA
    ERROR IN 620":STOP ELSE T=0
200 FOR I=32009 TO 32016
210 READ A$:A$="&H"+A$
220 A=VAL(A$):POKE I,A
230 T=T+A
240 NEXT I
250 IF T<>442 THEN PRINT"DATA
    ERROR IN 630":STOP ELSE T=0
260 FOR I=32017 TO 32024
270 READ A$:A$="&H"+A$
280 A=VAL(A$):POKE I,A
290 T=T+A
300 NEXT I
310 IF T<>789 THEN PRINT"DATA
    ERROR IN 640":STOP ELSE T=0
320 FOR I=32025 TO 32032
330 READ A$:A$="&H"+A$
340 A=VAL(A$):POKE I,A
350 T=T+A
360 NEXT I
370 IF T<>622 THEN PRINT"DATA
    ERROR IN 650":STOP ELSE T=0
380 FOR I=32033 TO 32040
390 READ A$:A$="&H"+A$
400 A=VAL(A$):POKE I,A
410 T=T+A
420 NEXT I
430 IF T<>521 THEN PRINT"DATA
    ERROR IN 660":STOP ELSE T=0
440 FOR I=32041 TO 32048
450 READ A$:A$="&H"+A$
460 A=VAL(A$):POKE I,A
470 T=T+A
480 NEXT I
490 IF T<>771 THEN PRINT"DATA
    ERROR IN 670":STOP ELSE T=0
500 FOR I=32049 TO 32056
510 READ A$:A$="&H"+A$
520 A=VAL(A$):POKE I,A
530 T=T+A
540 NEXT I
550 IF T<>965 THEN PRINT"DATA
    ERROR IN 680":STOP ELSE T=0
560 FOR I=32057 TO 32066
570 READ A$:A$="&H"+A$
580 A=VAL(A$):POKE I,A
590 T=T+A
600 NEXT I
610 IF T<>853 THEN PRINT"DATA
    ERROR IN 690 OR 700":STOP
620 DATA 20,01,12,81,0A,26,1D,B6
630 DATA 7D,03,81,01,26,0C,86,00
640 DATA B7,7D,03,86,39,B7,01,A7
650 DATA 20,0A,86,01,B7,7D,03,86
660 DATA 7E,B7,01,67,39,20,01,12
670 DATA 34,06,B6,7D,28,81,C8,25
680 DATA 08,7F,7D,28,4F,BD,A0,EA
690 DATA 81,20,26,F9,35,06,7C,7D
700 DATA 28,39
710 POKE 360,&H7D:POKE 361,&H26
720 POKE 363,&H7D:POKE 364,&H01
730 POKE 359,126:POKE 362,126
740 CLS:PRINT:PRINT"
    PROGRAM INSTALLED"
750 PRINT:PRINT"  PRESSING
    <DOWN-ARROW> TOGGLES"
760 PRINT"  PROGRAM ON AND OFF"
770 NEW
```



```
7D01             30      PRT $000C
7D01 2001        40      BRA @START
7D03 12          50 @TOGGLE NOP
7D04 810A        60 @START CMPA #10 DOWN ARROW
7D06 261D        70      BNE @OUT IF NOT THEN RETURN
7D08 B67D03      80      LDA @TOGGLE
7D0B 8101        90      CMPA #1 IS ROUTINE ON
7D0D 260C       100      BNE @SETLIST IF NOT PUT ON
7D0F 8600       110      LDA #0
7D11 B77D03     120      STA @TOGGLE SET OFF FLAG
7D14 8639       130      LDA #57
7D16 B70167     140      STA 359
7D19 200A       150      BRA @OUT
7D1B 8601       160 @SETLIST LDA #1
7D1D B77D03     170      STA @TOGGLE SET ON FLAG
7D20 867E       180      LDA #126 JUMP TO NEW ROUTINE
7D22 B70167     190      STA 359
7D25 39         200 @OUT RTS
7D26 2001       210      BRA @START1
7D28 12         220 @STORE NOP
7D29 3406       230 @START1 PSHS D
7D2B B67D28     240      LDA @STORE NO OF CHARS PRINTED
7D2E 81C8       250      CMPA #200
7D30 2508       260      BLO @OUT1
7D32 7F7D28     270      CLR @STORE
7D35 4F         280      CLRA
7D36 BDA0EA     290 @HOLD JSR 41194 GETS ROUTINE
7D39 8120       300      CMPA #32 SPACE PRESSED
7D3B 26F9       310      BNE @HOLD IF NOT WAIT
7D3D 3506       320 @OUT1 PULS D
7D3F 7C7D28     330      INC @STORE
7D42 39         340      RTS
7D43            350      END
```

In reverse

***Trevor Toms** continues his machine code series for the Spectrum – part three*

Last week we looked at the storage on simple data items and glanced at how the same ideas could be extended into the machine code equivalent of arrays. The next stage of this development is to consider how expressions can be evaluated and assigned to variables.

The direct comparison with Basic is that we are trying to write the equivalent of

```
LET x = b(4) * 8 + 2
```

in machine code.

The first step is to rewrite your expression in "reverse Polish" notation — just like calculators of a few years back (and today if you're lucky enough to afford a Hewlitt Packard!)

So our expression above would be written as

```
b(4) (stack)
8    (stack)
*
2    (stack)
+
```

giving a final result which will be stored in data area X using methods adopted last week.

Each operator (eg * or + in this case) operates on the top two stacked items to give a resulting value on the top of the stack. If you've used Forth, you'll be very familiar with this concept — in fact one reason why Forth is so fast is because the concepts translate very readily into machine code.

As a good guideline, try to keep to a strict convention regarding the use of registers in your routines. Personally, when writing a "Basic translation" program I use the *HL* registers to hold the "latest result" of any expression, the *DE* registers to hold array subscripts or second operand from an arithmetic operation, and the stack to hold the "latest result" when a nested expression is required.

Once again, it is worth stressing that this is not necessarily the best way to write machine code, but it is safe and helps assure working code until you have built up enough confidence to spread your horizons.

So we can now translate the small example above into machine code as follows:

```
b(4)    LD    DE 4
        CALL  GET$ITEM  ;see last week
8       LD    DE 8      ;direct value
*       CALL  MUL16     ;see 1st week
2       LD    DE 2      ;direct value
+       ADD   HL,DE     ;res lt in HL
LET x=  LD    (X) HL
```

Since the *MUL16* and *DIV16* routines leave their result in *HL*, you can see that the code required to evaluate this type of expression is extremely compact.

The equivalent of Basic functions becomes only a little more complex. By writing a series of small subroutines which operate on the value in registers *HL* and leave the result in *HL*, you can simulate most of the Spectrum functions quite easily. Listing 1 gives a handful of subroutines that simulate a fair proportion of the normal functions.

Remember that you cannot easily use floating point or strings in machine code without some degree of effort, so functions such as *Sin*, *Log*, *STR$* etc are not included in this list. Nevertheless, you can write some extremely powerful programs without these functions. In future articles you'll see how some of these limitations can be overcome.

The routines are *Equal*, *Not$Equal*, *Greater$Than*, *Less$Than*, *ZxAnd*, *ZxOr*, *ZxNot*, *ZxIn*, *ZxPeek*. In each case (except the last two), the routine operates on two values supplied in the *HL* and *DE* register pairs leaving a "true" or "false" result in *HL*. As with Basic "true" is represented by the value 1, while "false" is given by the value 0. It may have been more logical to use the value −1 (0FFFFh) for "true", but this would be inconsistent with Basic and would therefore require some additional translation when rewriting your Basic program in machine code.

The last two are examples of the way that true binary functions can be implemented — the subroutines operate on the value in *HL* and leave the result in *HL*. In practice, you can write the "peek" routine more efficiently by using in-line code instead of calling a subroutine, but, as I have said earlier, keeping things consistent is best for now.

Below is a better example of how to use some of these routines alongside an equivalent Basic program (see also listing 2).

Next week we start to look at ways of using the Spectrum hardware from machine code — this is where things start hotting up! ■

By Trevor Toms, author of The Spectrum Pocket Book, published by Phipps Associates.

```
                0
        LD                      ;set RESULT to zero
        LD    (result),
        CODE INKEY$: IF char = 0 THEN GO TO 10
        LD    A,1               ;select keyboard
        CALL  SELDEV
        CALL  AWAIT$KEY         ;wait for a key
        LD    L,A               ;put keycode into HL
        LD    H,0
        LD    (char),HL         ;and save it
      < 48) OR (char > 58) THEN GO TO 100
        LD    DE 48             ;check if < 48
        CALL  LESS$THAN
        LD    A,L               ;test if true reply
        OR    A
        JR    NZ,L100           ;yes — jump forward
        LD    HL,(char)         ;reload character value
        LD    DE 58             ;check if > 58
        CALL  GREATER$THAN
        LD    A,L               ;test for true reply
        OR    A
        JR    NZ,L100           ;jump forward if true
   LET result = (result * 10) + (char - 48)
        LD    HL,(result)       ;load current result
        LD    DE 10
        CALL  MUL16             ;multiply by 10
        PUSH  HL                ;save on stack
        XOR   A                 ;clear carry flag
        LD    HL,(char)         ;load character value
        LD    DE 48
        SBC   HL,DE             ;subtract 48
        POP   DE                ;get (RESULT * 10) into DE
        ADD   HL,DE             ;add to latest result
        LD    (result),HL       ;resave
40 GO TO 10
        JR    L10               ;jump back for more
100 PRINT result
   L100 LD    A,2               ;select screen output
        CALL  SELDEV
        LD    BC,(result)       ;load result value
        CALL  PRINT$NUM         ;print it
110 STOP
        RET                     ;return to Basic
```



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```
Addr Hex        Op    Operands

FF58            EQUAL:
FF58 A7          AND   A
FF59 ED52        SBC   HL,DE
FF5B 210000      LD    HL,0
FF5E C0          RET   NZ
FF5F 23          INC   HL
FF60 C9          RET
FF61            NOT$EQUAL:
FF61 A7          AND   A
FF62 ED52        SBC   HL,DE
FF64 210100      LD    HL,1
FF67 C0          RET   NZ
FF68 2B          DEC   HL
FF69 C9          RET
FF6A            GREATER$THAN:
FF6A EB          EX    DE,HL
FF6B            LESS$THAN:
FF6B A7          AND   A
FF6C ED52        SBC   HL,DE
FF6E 7C          LD    A,H
FF6F 17          RLA
FF70 210000      LD    HL,0
FF73*E20000      JP    PO,LTB
FF76 3F          CCF
FF77            LTB:
FF77 ED6A        ADC   HL,HL
FF79 C9          RET
FF7A            ZXPEEK:
FF7A 6E          LD    L,(HL)
FF7B            PKB:
FF7B 2600        LD    H,0
FF7D C9          RET
FF7E            ZXIN:
FF7E 44          LD    B,H
FF7F 4D          LD    C,L
FF80 ED68        IN    L,(C)
FF82 18F7        JR    PKB
FF84            ZXNOT:
FF84 7C          LD    A,H
FF85 B5          OR    L
FF86 210000      LD    HL,0
FF89 C0          RET   NZ
FF8A 23          INC   HL
FF8B C9          RET
FF8C            ZXAND:
FF8C 7C          LD    A,H
FF8D A2          AND   D
FF8E 67          LD    H,A
FF8F 7D          LD    A,L
FF90 A3          AND   E
FF91 6F          LD    L,A
FF92 C9          RET
FF93            ZXOR:
FF93 7C          LD    A,H
FF94 B2          OR    D
FF95 67          LD    H,A
FF96 7D          LD    A,L
FF97 B3          OR    E
FF98 6F          LD    L,A
FF99 C9          RET
Symbols:
EQUAL  FF58     NOT$EQ FF61
GREATE FF6A     LESS$T FF6B
LTB    FF77     ZXPEEK FF7A
PKB    FF7B     ZXIN   FF7E
ZXNOT  FF84     ZXAND  FF8C
ZXOR   FF93
No error(s)
```

```
Addr Hex        Op    Operands

FA00            SELDEV:
FA00             EQU  1601H
FA00            PRINT$NUM:
FA00             EQU  1A1BH
FA00            AWAIT$KEY:
FA00             EQU  15D4H
FA00            LESS$THAN:
FA00             EQU  OFF6BH
FA00            GREATER$THAN:
FA00             EQU  OFF6AH
FA00            MUL16:
FA00             EQU  65000
FA00             ORG  64000
FA00            ENTRY$POINT:
FA00 210000      LD   HL,0
FA03*220000      LD   (RESULT),HL
FA06            L10:
FA06 3E01        LD   A,1
FA08 CD0116      CALL SELDEV
FA0B CDD415      CALL AWAIT$KEY
FA0E 6F          LD   L,A
FA0F 2600        LD   H,0
FA11*220000      LD   (CHAR),HL
FA14 113000      LD   DE,48
FA17 CD6BFF      CALL LESS$THAN
FA1A 7D          LD   A,L
FA1B B7          OR   A
FA1C*2000        JR   NZ,L100
FA1E*2A0000      LD   HL,(CHAR)
FA21 113A00      LD   DE,58
FA24 CD6AFF      CALL GREATER$THAN
FA27 7D          LD   A,L
FA28 B7          OR   A
FA29*2000        JR   NZ,L100
FA2B*2A0000      LD   HL,(RESULT)
FA2E 110A00      LD   DE,10
FA31 CDE8FD      CALL MUL16
FA34 E5          PUSH HL
FA35 AF          XOR  A
FA36*2A0000      LD   HL,(CHAR)
FA39 113000      LD   DE,48
FA3C ED52        SBC  HL,DE
FA3E D1          POP  DE
FA3F 19          ADD  HL,DE
FA40*220000      LD   (RESULT),HL
FA43 18C1        JR   L10
FA45            L100:
FA45 3E02        LD   A,2
FA47 CD0116      CALL SELDEV
FA4A*ED4B0000    LD   BC,(RESULT)
FA4E CD1B1A      CALL PRINT$NUM
FA51 C9          RET
FA52            CHAR:
FA52 0000        DEFW 0
FA54            RESULT:
FA54 0000        DEFW 0

Symbols:
SELDEV 1601     PRINT$ 1A1B
AWAIT$ 15D4     LESS$T FF6B
GREATE FF6A     MUL16  FDE8
ENTRY$ FA00     L10    FA06
L100   FA45     CHAR   FA52
RESULT FA54
No error(s)
```

Programming by angles

***Czes Kosniowski** explains the use of trigonometry in programming*

Seldom can we directly measure the heights of tall buildings hills trees, etc One way to find the height of a building or tree is to stand away from the object Now measure the angle between the horizontal and the highest point of the object (using a clinometer which is just a glorified protractor) then measure the distance between you and the object By drawing a scale drawing the height of the object can be readily estimated See Figure 1

Figure 1

You couldn t use the same technique to measure the height of a mountain peak which is miles away and covered in clouds The clouds would get in your way and you couldn t measure the horizontal distance An instrument such as a tellinometer would help This uses radar to locate the top of the mountain It also measures the angle and distance between you and the top A scale drawing would provide a way of calculating the height of the mountain (Figure 2)

Figure 2

As a further example suppose we wanted to find the width of a large pond or lake (see Figure 3) A scale drawing drawn from the measurements made could be produced and the required distance estimated

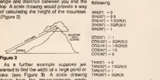


Figure 3

Here is a related example A navigator is at a certain position A He is 150 km due west of city B and 188 km from city C The angle between the two cities is 23 degrees measured from his position How far apart are the two cities? Again a scale drawing could provide the answer

Although scale drawing will provide answers to the problems mentioned above they are rough and ready And it is not always practicable or accurate to produce scale drawings An alternative approach is to do it by trigonometry using your Commodore 64

The trigonometry functions

The three important trigonometric functions are SIN (sine function) COS (cosine function) and TAN (tangent function) They each represent ratios of the various sides of a right-angled triangle For example, the triangle in Figure 4 is a right-angled triangle The angle at the corner of the left is denoted by the symbol X The three sides of the triangle will be referred to as the side adjacent to X, the side opposite X and the hypotenuse (the longest side)

$$TAN(X) = \frac{opposite}{adjacent}$$

$$SIN(X) = \frac{opposite}{hypotenuse}$$

$$COS(X) = \frac{adjacent}{hypotenuse}$$

Some useful values to remember are the following

```
SIN(0°)  = 0
SIN(30°) = 0 5
SIN(45°) = 1/SQR(2)
SIN(60°) = SQR(3)/2
SIN(90°) = 1

COS(0°)  = 1
COS(30°) = SQR(3)/2
COS(45°) = 1/SQR(2)
COS(60°) = 1/2
COS(90°) = 0

TAN(0°)  = 0
TAN(30°) = 1/SQR(3)
TAN(45°) = 1
TAN(60°) = SQR(3)
```

Figure 4

If you know the angle X and one of the three lengths of a right angled triangle then you can find the other two lengths For example, if you know the angle X and the length of the adjacent side then the other two lengths are given by the following formulas

```
opposite   = TAN(X) * adjacent
hypotenuse = adjacent/COS(X)
```

Another way of describing the trigonometric function is by using a circle of radius 1 unit Measure out the angle required as shown in Figure 5 The values of the various trigonometric functions are indicated

Figure 5

Mathematically distances are measured horizontally from left to right and vertically upwards This explains why for instance in Figure 6 *Cos(X)* has a negative value

Figure 5

You can obtain SIN, COS and TAN of an angle X by typing *Print Sin(X)* etc substituting the appropriate value of X The only possible problem is that the Commodore 64, like most microcomputers expects the angles in radians, not degrees Fortunately, degrees can be turned into radians and vice versa very easily

First of all what is a radian? Draw a circle of radius 1 unit Measure along the circumference of your circle a distance which is equal to the radius of the circle The angle subtended by this arc is 1 radian 1 radian is approximately 57° See Figure 7

Figure 7

The number π is both remarkable and famous It is defined to be the ratio of the circumference of a circle to its diameter The (approximate) value of π is stored in your Commodore 64 Simply type *Print* π to reveal the value stored In a circle of radius 1 unit the diameter is 2 units Thus the circumference of this circle is 2*π and so there are 2*π radians in a complete circle Since there are 360 degrees in a complete circle we see that

360° = 2*π radians and
180° = π radians

We can convert degrees to radians and vice versa quite easily with the following formula

X degrees = X*π/180 radians
Y radians = Y*180/π degrees

The following program can be used to find lengths of right-angled triangles You need to input an angle and one distance Program 1 calculates the other two lengths

Inverse functions

Suppose we know the lengths of the sides of a right-angled triangle, can we determine the various angles? The answer is yes, and we use the inverse trigonometric functions to do this. Given an angle X then $Tan(X)$ gives us a number, the tangent of the angle X. Conversely, given a number N we could find an angle whose tangent is that number. Such an angle could then be called the inverse tangent of N. It is usually denoted by $Atn(N)$, the arc tangent of N.

Look at the triangle in Figure 8.

Figure 8

If we know the values of A and B then we could find the value of the angle X. We know that $Tan(X) = B/A$, thus $X = Atn(B/A)$. You can put in the appropriate values in this expression and get your Commodore 64 to print out the answer. Of course, the answer would be in *radians*. To get an answer in degrees you need to multiply the result by $180/\pi$.

The trigonometric functions SIN and COS also have inverse functions denoted by *Asn* (arc sine) and *Acs* (arc cosine) respectively. $Asn(N)$ is that angle whose sine is N, similarly $Acs(N)$ is that angle whose cosine is N. Unfortunately the Commodore 64, in common with many other microcomputers, does not contain these functions in its basic. However they can be easily obtained from the *Atn* function.

To see how we obtain *Asn* from *Atn*, look at the right angled triangle with a hypotenuse of length 1 unit in Figure 9.

Figure 9

Now suppose that we know the value of B, and we want to find the angle X. We know that $Sin(X) = B$ so that $X = Asn(B)$ but as was mentioned *Asn* isn't present in the Commodore 64. If we knew the value of A then we could use *Atn* since $X = Atn(B/A)$ also. To find A we use Pythagoras theorem.

Recall the theorem of Pythagoras. In words Pythagoras' theorem states that the square of the hypotenuse of a right-angled triangle is equal to the sum of the squares of the other two sides. In symbols we have

$C^2 = A^2 + B^2$

where C is the length of the hypotenuse. Since our hypotenuse is of length 1 we have

1 = A*A + B*B

or

A*A = 1 − B*B

and so

A = SQR(1 − B*B)

Since $X = Atn(B/A)$ we obtain

X = ATN(B/SQR(1 − B*B))

also, $Asn(B) = X$, and so we obtain

ASN(B) = ATN(B/SQR(1 − B*B))

In a similar way we could produce a formula for $Acs(A)$, one such is given below

ACS(A) = π/2 − ATN(A/SQR(1 − A*A))

You should notice that $Acs(A) = \pi/2 - Asn(A)$.

Appendix H of the Commodore 64 User Manual contains other examples of mathematical functions which may be useful ■

This is an extract from *Mathematics on the Commodore 64* by Cees Kolnieskal, published by Sunshine Books

```
10 REM PROGRAM FOR RIGHT-ANGLED
TRIANGLES
20 PRINT CHR$(147) "    RIGHT-ANGLED
 TRIANGLES" CHR$(17)
30 PRINT "THIS PROGRAM ENABLES
YOU TO FIND THE"
40 PRINT "SIDES OF A RIGHT ANGLED
TRIANGLE"
50 PRINT "PROVIDED YOU KNOW ONE
SIDE AND ANGLE." CHR$(17)
60 PRINT "                  N%
                          N %"
70 PRINT "                 N  %
                        N   %"
80 PRINT " HYPOTENUSEN    %OPPOSITE
                      N    %"
90 PRINT "            NANGLE %
                      ####### "
95 PRINT "            ADJACENT" CHR$(17
)
100 REM INPUT DETAILS
110 INPUT "ANGLE. IN DEGREES. ";X
120 IF X<=0 OR X>=90 THEN PRINT
"ERROR - NOT A TRIANGLE":GOTO 110
130 PRINT CHR$(17) "WHICH SIDE DO
YOU KNOW? 1 (OPPOSITE)"
140 PRINT "2 (ADJACENT) OR 3
(HYPOTENUSE)."
150 INPUT "TYPE 1, 2 OR 3 ";T
160 IF T<1 OR T>3 OR T<>INT(T)
THEN 150
170 PRINT CHR$(17) "TYPE IN THE
LENGTH OF THIS SIDE."
180 INPUT "LENGTH ";L
190 IF L<=0 THEN PRINT "FUNNY -
TRY AGAIN":GOTO 180
200 REM CONVERT TO RADIANS
210 X=X/180
220 REM THE SPLIT OFF
230 ON T GOSUB 300,350,400
240 PRINT CHR$(17) "    THAT'S IT -
ANOTHER GO Y OR N?"
250 GET G$:IF G$<>"Y" AND G$<>"N"
THEN 250
260 IF G$="Y" THEN RUN
270 PRINT CHR$(147) "BYE FOR NOW."
:END
300 REM OPPOSITE SIDE KNOWN
310 PRINT CHR$(17) "ADJACENT SIDE:"
L/TAN(X)
320 PRINT "   HYPOTENUSE:" L/SIN(X)
330 RETURN
350 REM ADJACENT SIDE KNOWN
360 PRINT CHR$(17) "OPPOSITE SIDE:"
TAN(X)*L
370 PRINT "   HYPOTENUSE:" L/COS(X)
380 RETURN
400 REM HYPOTENUSE KNOWN
410 PRINT CHR$(17) "OPPOSITE SIDE:"
SIN(X)*L
420 PRINT "ADJACENT SIDE:" L*COS(X)
430 RETURN
```

An easy life for some

***Kaith and Steven Brain** takes a look at programming aids for the Dragon 32*

Moving on from sound and graphics (*PCW* 24 30 November) here are some programming aids for the Dragon 32 which can make your life much easier

Toolkit (Premier) is for those who prefer to stick to Basic rather then delve into machine code It is available on disc or as an Eprom (within Delta or separate) and it adds over 50 new commands to Basic Although programs incorporating the new commands will only run if *Toolkit* is present the program also has some first-class editing commands which can be used to edit any program

The full screen editor is a twin cursor type which allows you to copy characters from the editing cursor to the normal cursor You can use the full screen editor in co-operation with the Dragon's standard editing facilities (so that there are not a lot of new commands to remember), or you can recopy a whole line To save the problem of text scrolling off the top of the screen you can move text to one of two other text screens and also swap text screens

Extensive search and replace facilities are included and *Plan* gives you total control over output to a printer controlling factors such as paging column length, margin etc Extra cassette handling commands are *Cdir* (gives a directory of a tape) and *Cappend* (appends from tape)

Inkey is like *Inkey$*, but gives the Ascii value of a key pressed, while *Key$* and *Key* are like *Inkey$* and *Inkey* but with built-in auto repeat *Inp n,A$* gives you a controllable length for an *Input* so that you can prevent an ignorant (or malicious) user entering an illegally long string *Deek* and *Doke Peek* and *Poke* two bytes at a time with a 16-bit number *Beep On/Off* controls

a keyboard beep and *Break On/Break Off* enables/disables the break key

Echo x–y,z copies lines *x* to *y* from *z* downwards and *Prune* removes everything after a Rem statement *Vars* prints the active variable in a program, *Pause* waits for a specified number of milliseconds and *Hang* waits for a key to be pressed A number of commands are provided to control low-res graphics The comprehensive error handling commands (*Erl Err, Error n, Error Goto n, Error Off, Resume Resume Next* and *Resume Goton*) can be used to prevent your program from stopping if there is an error

The *Resume* commands are important, as they allow you to continue immediately with your program (unlike the error commands in *Dragondos*) *Old* attempts to rescue a crashed program You are allowed to *Goto* and *Gosub* line numbers specified as variables and you can program the keys *A-H* with up to 23 characters including *Enter* For example if you use

```
PROGA "PAGE" + CHR$(13) + "BEEP" + CHR$
(13) + "HANG" + CHR$(13) + "RUN" + CHR$(13)
```

then when you press *Shift* and *A*, it will *Page* your program, *Beep*, *Hang* and then *Run*

Even after all that description we have still left out some very useful features so you can probably understand why we believe the Premier *Toolkit* is outstanding value at £29 95

Encoder 09 (Premier) is a monitor, assembler and disassembler for the Dragon which comes on cassette disc (Delta) or Eprom (available as an option on the Delta Dos cartridge) The comprehensive manual is 52 pages long and includes details of the 6809 registers, instruction sets and different types of addressing as well as the operation of the system

The program starts up in the monitor mode, where a colon prompt before the cursor informs you that you are using the monitor Typing *B* moves you to Basic and *&M* returns to the monitor You can examine and change memory locations and search the memory for a Hex number or an Ascii string

Block moves are allowed and you can execute machine code routines from the monitor which will convert or calculate Hexadecimal Octal Binary and Decimal values and also has extensive breakpoint routines It is fully compatible with Dragon Basic and there is automatic line numbering and tabulation and a full complement of pseudo-opcodes

You can incorporate assembly language within Basic programs by enclosing the code between square brackets You can perform a test assemble to check the syntax before moving on to the real thing and assembly can be to memory, cassette, printer, or disc There are 19 error messages to help sort out any problems

Encoder 09 costs £29 95 on tape £34 95 on Eprom as a Delta addition and £39 95 on cartridge We found it easy to use and, if you want to get into machine code programming, then this is a sound investment

Memory Module (Moray Microsystems) is a low power Cmos static Ram memory module running off Ni-Cads which are trickle charged when the computer is on It can be used to provide instant memory back-up in case of a system crash or provide a temporary, reusable, "cartridge" facility The unit is larger than a normal cartridge and to prevent it flopping about th the expansion port, there are small plastic feet underneath the case Before turning the Dragon off you must remember to turn the memory protection switch on and, before you recover or store programs, you must put the memory protection off

It is easy to store and retrieve a program using a small machine code routine You could put this routine at the end of a Basic program and instead of *Csaving* the latest copy of your program every half an hour (in case the gremlins get loose in the mains supply), you could dump it into the memory module

The module is available in a number of Ram configurations (4 to 14K) but for example will hold 4K for 63 days using ultra low power Cmos (£42) or 16 6 days using lower power Cmos (£39) This product is rather specialised, but would be of value in program development (especially if you don't have a disc system) or in education where you might want to change the cartridge contents at regular intervals

The standard Dragon 32 interface is of the parallel Centronics type although the new Dragon 64 also has a serial RS232 port Many other machines have RS232 and the addition of this facility allows you to communicate more widely

RS232C Interface (Cotswold Computers/CP Engineering) is a cartridge which comes with a detailed manual which explains the RS232 standard and how to transmit and receive data Two demonstration programs are provided the first being an interface test and the second a program to transmit the graphics screen from one Dragon to another (as we only

had a single interface we could not test the latter) The baud rate is easily controlled by an external, colour-coded, dip switch, and a brief description of the electronic specification is included

It allows you to use any serial printer on the Dragon, communicate between your Dragon and any other machine with an RS232 interface and eventually to communicate through a modem (which is currently under development) to the whole world although of course you still need to write the software to control it! This is another rather specialised product which will be of interest to the minority, although no doubt invaluable to them The interface has already been used to connect the Dragon to a number of pieces of specialised scientific equipment

In addition to serial and parallel ports, it is also useful to have straightforward input and output connections for control applications *Dragon Interface* (Moray Microsystems) is an input/output module which allows the Dragon cartridge port to be used as a 4 or 8 input port (opto-isolated) with up to 8 relay output ports Once the module has been configured, inputs are easily ready by *Peeking* location *49152* and relays operated/released by *Poking* appropriate values to *49153*

The module will accept dc inputs from +3 to +15 volts and the output channels will switch up to 220 volts at 0 5 amps Data at the input channels is indicated by integral leds and connections to the unit are made via clearly marked terminal blocks, once you have managed to persuade four very small hex-head screws to come loose

Possible applications of this unit are many and varied (we hope to report further on this in the near future), for example, you could easily control your model railway (or robot?) Another obvious application is to build a sophisticated intelligent burglar alarm system which can tell the difference between your cat sitting on the mat or rattling the window and a real threat.

The price depends on the specification, but it is based on a flat charge of £20 for 4 inputs or £28 for 8 inputs and then £3 per relay output (so that a full specification 8 input/8 output module costs £52) An add-on power module is also being made available (at around £40) which will switch 13 amp mains loads so that you can really let your computer control your central heating greenhouse etc This unit certainly extends the power of your Dragon into interesting control applications.

Last but not least there are the lightpens which plug directly into the joystick ports of the Dragon and allow you to control the execution of your programs without touching a key The Trojan Lightpen (Trojan Products) is a relatively simple device supplied with a program on cassette and a combination of instructions printed on the cassette insert and incorporated into the program The main menu allows you to select options to run through the instructions, draw a simple histogram of light level, play a game of *Nim*, use the light pen to select which notes to sound, or draw directly on the screen The drawing routine only uses *Pmode 1* so the results are rather crude and you still have to use the keyboard as well, which rather defeats the object of using a lightpen!

Its value seems rather limited but it is relatively cheap at £10

The Datapen Lightpen (Datapen Microtechnology) is supplied with comprehensive instructions and a tape with three programs It differs from all other light pens available for the Dragon in that it is a far more sophisticated (and rather more expensive at £25) beast Important unusual features are a button mounted on the pen itself which controls operation and an led which indicates data capture

The pen is also easier to use than most, because of its larger size and because the end is flattened and covered with non-slip rubber It also seemed quite insensitive to changes in ambient light

The first program provided is an introduction which allows you to work through instructions on how the pen works produce a low-res flowchart or find an X Y screen position The second program is *Sketch* in which you can draw directly on the screen using any *Pmode* Four options can be selected with the pen (*Draw Erase line Blank Move* and *Paint*) and by also using the keyboard you can save to tape, draw a circle and change the accuracy factor and measurement bars This program uses a much faster screen strobe (which can easily be modified) and it clearly demonstrates the superiority of the Datapen

The *Shape Create* program is very useful as it allows you to produce designs directly on a screen matrix and then save these in a "library" in memory or on tape and use them later The *Create more sprites* option allows you to design scaled-up sprites on the screen while a normal sized version is drawn alongside with total control by the lightpen If you select the *Create Drawing* mode then you can pick a sprite from the library you created and put it at any screen position at any of four 90-degree angles

Although we have tended to be rather cynical about the value of lightpens in the past the Datapen has transformed our views and is no doubt the best buy for anyone with a serious use

Adding on all the facilities of all these products at the same time would certainly produce one hell of a machine but with all those "odd-on-goodies we are sure that you would also need some "go-faster" stripes as well ■

Firm	Program	Cost
Premier 208 Croydon Road Anerly London SE20 7YX	*Toolkit* *Encoder 09*	£23 95 £29 95*
Moray Microsystems 17 Kirkton Place Elgin IV30 3JR	*Memory Module* *Dragon Interface*	£42† £52†
Cotswold Computers 6 Middle Row Chipping Norton Oxfordshire	*RS232C*	
Trojan Products 166 Derlwyn Dunvant Swansea	*Lightpen*	£10
Datapen Microtechnology Kingsclere Road Overton Hants	*Lightpen*	£25

*Tape †Varies according to option



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To the letter

Ian and Damian Inger present Word Search *for the 32K BBC*

This program is an educational type, for use with a group of pupils rather than one person alone. The teacher has to write a short passage (20 lines of 31 characters) on the screen which then clears and the pupils are presented with a screen of coloured blocks, one for each letter. All punctuation marks and spaces are put on to the screen for the pupils.

At random intervals, all occurrences of the guess letter are filled in on the screen. At 15 guess intervals the pupils are invited to write out a two-line message saying what they think the passage is about.

The program is designed to encourage group discussion about the positioning of letters and the frequency of certain letters within the passage. ■

```
10REM  Word search
20REM  By Ian & Damian Inger
30REM  (c) Nov 1983
40REM
50REM
60MODE7
70PROCinit
80PROCteacher_instruction
90PROCenter
100PROCpupil_instruction
110PROCpunc
120PROCmove
130PROCguess
140PROCcheck
150R=RND(7):IF R=3 AND (A<136 OR
A>139) THEN PROCluck
160GOTO 120
170END
180DEFPROCinit
190T=0
200Q=0
210VDU23;8202;0;0;0;
220DIM A$(31,20)
230DIM B$(31,20)
240DIM T$(30)
250*K.9"'"
260*K.10OLD|MRUN|M
270G$=CHR$(130)
280S$=CHR$(255)
290R$=CHR$(129)
300C$=CHR$(134)
310X1%=0:Y1%=0
320ENDPROC
330DEFPROCteacher_instruction
340CLS
350PRINT"Instructions to the teacher"
360PRINT
370PRINT"You should type the test
passage in      CAPITAL LETTERS only."
380PRINT"If you make a mistake,
press the Delete key to erase it."
390PRINT"The program will accept
20 lines of 31  characters."
400PRINT"When you are typing the
test, the ";S$;" willmove to the next
line automatically. Youmay press
'Return' at any time to  move to the
start of the next line."
410PRINT"When the last line is
complete, the "
420PRINT"instructions for your pupils
will be    displayed."
430REPEAT:PRINTTAB(0,23)"PRESS SPACE
BAR TO CONTINUE":UNTIL GET
440ENDPROC
450DEFPROCpupil_instruction
460CLS
470*FX15,1
480PRINT"INSTRUCTIONS"
490PRINT
500PRINT"This is similar to Hangman.
All you haveto do is fill in the blue
squares with  letters."
510PRINT"You will see a '£' on the
screen. This  is where you make your
guess."
520PRINT"The '£' will always find the
next free  space for you, but you may
move the '£' around the screen with the
arrow keys ifyou wish."
530PRINT"If your guess is right,
the £ will move to the next space."
540PRINT"If your guess is wrong, the
£ will stay where it is."
550PRINT"If you are lucky, the
computer will findyour guess letter on
every line and fillit in for you."
560REPEAT:PRINTTAB(0,23)"PRESS SPACE
BAR TO CONTINUE":UNTIL GET
570CLS
580PRINT"Sometimes, you will be asked
 to write a short message saying what
you think the story is about. At the
end, press red   key 9 and all of your
messages will be  shown."
590PRINT
600PRINT"The total time taken for
you to completethe puzzle is also
shown."
610PRINT
620PRINT"You may press 'Return'
at any time to   see the instructions."
630REPEAT:PRINTTAB(0,23)"PRESS
SPACE BAR TO CONTINUE":UNTIL GET
640TIME=0
650ENDPROC
660DEFPROCenter
670CLS
680FOR Y=0 TO 20
690PRINTTAB(0,Y);G$:
700PRINTTAB(35,Y);Y+1;
710NEXT
720PRINTTAB(0,21);R$:PRINTTAB
(0,22);R$
730PRINTTAB(1,21)"USE CAPITAL
LETTERS ONLY"
740PRINTTAB(1,22)"PRESS 'DELETE'
IF YOU MAKE A MISTAKE"
750X=0:Y=0
760REPEAT
770PRINTTAB(X+2,Y);S$
780A$(X,Y)=GET$
790AS=ASC(A$(X,Y))
800IF AS=13 AND X<31 THEN REPEAT:
PRINTTAB(X+2,Y);" ":A$(X,Y)=" ":X=X+1:
```

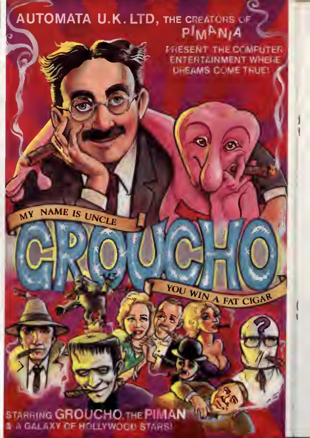
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```
UNTIL X=32:X=31
  810IF AS=127 THEN PRINTTAB(X+2,Y);
" ";:A$(X,Y)="":X=X-1:IF X<0 THEN
X=31:Y=Y-1
  820PRINTTAB(X+2,Y):A$(X,Y)
  830IF A8<>127 THEN X=X+1
  840IF X=32 THEN PRINTTAB(X+2,Y)"
":X=0:Y=Y+1
  850UNTILY=21
  860*FX15,1
  870ENDPROC
  880DEFPROCpunc
  890CLS
  900FOR Y=0 TO 20
  910PRINTTAB(0,Y);C$;
  920NEXT
  930FOR Y=0 TO 20
  940FOR X=0 TO 31
  950IF ASC(A$(X,Y))<65 THEN
B$(X,Y)=A$(X,Y)
  960IF ASC(A$(X,Y))>=65 THEN B$(X,Y)=S$
  970PRINTTAB(X+2,Y);B$(X,Y)
  980NEXT
  990NEXT
 1000ENDPROC
 1010DEFPROCmove
 1020*FX15,1
 1030*FX4,1
 1040PRINTTAB(X1%+2,Y1%);"£"
 1050A=GET
 1060IF A=13 THEN PROCinstructions
 1070IF A=33 THEN PROClist
 1080PRINTTAB(X1%+2,Y1%);B$(X1%,Y1%)
 1090IF A=49 THEN PROClist
 1100IF A=136 THEN X1%=X1%-1
 1110IF A=137 THEN X1%=X1%+1
 1120IF A=138 THEN Y1%=Y1%+1
 1130IF A=139 THEN Y1%=Y1%-1
 1140IF X1%<0 THEN X1%=31:Y1%=Y1%-1
 1150IF X1%>31 THEN X1%=0:Y1%=Y1%+1
 1160IF Y1%<0 THEN Y1%=0
 1170IF Y1%>20 THEN Y1%=20
 1180PRINTTAB(X1%+2,Y1%);B$(X1%,Y1%)
 1190ENDPROC
 1200DEFPROCguess
 1210T=T+1:IF T/15=INT(T/15)
THEN PROCtele
 1220G$=CHR$(A)
 1230IF A>135 AND A<140 THEN ENDPROC
 1240PRINTTAB(X1%+2,Y1%);G$
 1250ENDPROC
 1260ENDPROC
 1270DEFPROCcheck
 1280IF A>135 AND A<140 THEN ENDPROC
 1290IF A=13 THEN ENDPROC
 1300IF G$<>A$(X1%,Y1%) THEN
PRINTTAB(0,23)"WRONG":FOR H=20 TO 0
STEP -1:SOUND 1
,-10,H,1:NEXT:ENDPROC
 1310B$(X1%,Y1%)=G$
 1320X1%=X1%+1:IF X1%>31 THEN X1%=0:
Y1%=Y1%+1:IF Y1%>20 THEN Y1%=0
 1330IF B$(X1%,Y1%)<>G$ THEN 1320
 1340ENDPROC
 1350DEFPROCluck
 1360FOR X%=0 TO 31
 1370FOR Y%=0 TO 20
 1380IF A$(X%,Y%)=G$ THEN PRINTTAB
(X%+2,Y%);G$:B$(X%,Y%)=A$(X%,Y%)
 1390NEXT
 1400NEXT
 1410ENDPROC
 1420DEFPROCtele
 1430CLS
 1440PRINT"What do you think this
is about?"
 1450PRINT"Type your ideas below, but
don't use    more than two lines."
 1460PRINT"Press Return when you
have finished"
 1470PRINT:PRINT:PRINT
 1480INPUTT$(Q):Q=Q+1
 1490CLS
 1500FOR Y=0 TO 20
 1510PRINTTAB(0,Y):C$
 1520NEXT
 1530FOR X%=0 TO 31
 1540FOR Y%=0 TO 20
 1550PRINTTAB(X%+2,Y%);B$(X%,Y%)
 1560NEXT
 1570NEXT
 1580ENDPROC
 1590DEFPROCinstructions
 1600CLS
 1610PRINTCHR$141+"INSTRUCTIONS"
 1620PRINTCHR$141+"INSTRUCTIONS'
 1630PRINT:PRINT:PRINT
 1640PRINT"The '£' will move to the
next space on  its own"
 1650PRINT"If you do not want to make
a guess thereuse the arrow keys to
move the '£'       around the screen"
 1660PRINT"When the '£' is in position,
 type in     your guess"
 1670PRINT"When you have finished the
whole story, press";CHR$(129);"red
key 9"
 1680PRINT"This will list your
messages"
 1690PRINT:PRINT
 1700PRINT"If there is anything
else which you do  not understand,
ask your teacher"
 1710REPEAT
 1720PRINTTAB(0,23)"PRESS SPACE BAR
TO CONTINUE"
 1730UNTIL GET
 1740CLS
 1750*FX15,1
 1760FOR X=0 TO 31
 1770FOR Y=0 TO 20
 1780PRINTTAB(0,Y);C$
 1790PRINTTAB(X+2,Y);B$(X,Y)
 1800NEXT
 1810NEXT
 1820ENDPROC
 1830DEFPROClist
 1840CLS
 1850PRINT
 1860PRINT"Your guesses were:-"
 1870FOR L=0 TO Q
 1880PRINTT$(L)
 1890NEXT
 1900PRINT"Time taken ";(TIME DIV
6000)MOD 60;" minutes"
 1910END
```

Open Forum is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the *Program of the Week* double our new fee of £6 for each program published.

Bug Fever

on Spectrum

In this game you control a frog on a lily pond surrounded by reeds. The aim of the game is to catch as many insects with the frog's sticky tongue as possible. You have 60 seconds in which to do this; four additional seconds are taken away if you jump into the pond. Scores vary depending on the type of insect you catch, ie, dragonflies, butterflies, or flies. Controls are

5 — Skip left
8 — Skip right
6 — Jump left
7 — Jump right
0 — Release the frog's tongue

When a game finishes the program goes into demo mode and you can press 'r' to re-start a new game. When keying in the listing, first run the user defined character part.

```
   1 DATA 14,17,17,38,37,42,118,
63,96,152,8,8,16,32,132,248,96,1
56,66,48,12,7,8,9,3,4,108,161,23
4,100,4,2,24,32,54,170,85,64,32,
24,0,8,199,52,61,255,52,32,0,127
,1,0,1,127,0,0,3,14,255,255,255,
14,3,0
   2 DATA 240,0,128,128,128,0,24
0,0,0,0,0,0,130,130,130,186,187,
254,124,124,56,56,56,56,108,68,6
8,68,68,68,68,0,0,34,34,34,34,34
,34,54,28,28,28,28,62,62,127,63,
93,65,65,68,65,0,0,0,112,216,124
,128,255,127,63,255
   3 DATA 14,27,62,136,256,264,2
52,256,240,0,128,255,128,0,240,0
,0,0,254,128,0,196,264,0,0,192,1
12,255,255,255,112,192,0,15,0,1,
4,1,0,15
   4 RESTORE : FOR q=0 TO 167 ST
EP 8: FOR r=0 TO 7: READ a: POKE
 USR "a"+q+r,a: NEXT r: NEXT q
  10 DATA BIN 1010010,BIN 010101
01,BIN 01010101,BIN 00101011,BIN
 00101011,BIN 10010111,BIN 10001
111,BIN 01111111,BIN 01100101,BI
N 01101010,BIN 10101010,BIN 1101
0100,BIN 11010100,BIN 11101001,B
IN 1110001,255
  18 DATA BIN 1010010,BIN 010101
01,BIN 01010101,BIN 00101011,BIN
 00101011,BIN 10010111,BIN 10001
111,BIN 01111111,BIN 01100101,BI
N 01101010,BIN 10101010,BIN 1101
0100,BIN 11010100,BIN 11101001,B
IN 1110001,255
  20 DATA 14,17,17,35,37,42,116,
53,96,152,8,8,16,32,132,248
 900 BORDER 5: PAPER 5: BRIGHT 1
: CLS : FOR n=0 TO 10: PRINT AT
n,0; PAPER 5,,: NEXT n: FOR n=11
 TO 21: PRINT AT n,0; PAPER 1,,:
NEXT n
 901 INK 7: FOR r=0 TO 88 STEP 1
6: FOR q=0+RND*4 TO 255 STEP 16:
 PLOT q,r: DRAW 2,2: DRAW 2,-1:
NEXT q: NEXT r
 911 LET time=60: LET score=0
 912 INK 1: PAPER 4: PRINT AT 17
,3;"[illegible]"
 913 PRINT AT 18,3;"[illegible]"
 914 PRINT AT 19,3;"[illegible]"
 916 INK 0: PAPER 4: PLOT 35,26:
 DRAW 170,0
 915 FOR n=45 TO 190 STEP 8: PLO
T n,26: DRAW 8,8: DRAW -8,-8: DR
AW 8,-8: NEXT n
 917 FOR n=0 TO 255: PLOT INK 4;
n,5: DRAW INK 4;0,INT (RND*8): N
EXT n
 918 RESTORE 10: FOR n=0 TO 15:
READ a: POKE USR "a"+n,a: NEXT n
 919 PRINT AT 19,1; INK 3; PAPER
 1;"[illegible]";AT 16,3; INK 6; PAPER 1;
"[illegible]";AT 16,26; INK 7; PAPER 1;"[illegible]
[illegible]";AT 19,28; INK 8; PAPER 1;"[illegible]"
 920 RESTORE 20: FOR n=0 TO 15:
READ a: POKE USR "a"+n,a: NEXT n
 930 FOR q=1 TO 0 STEP -.1: PLOT
 INK 6;224,175: DRAW INK 6;31,-q
*4: q: NEXT q
 940 OVER 0: FOR r=40 TO 200: FO
R q=1 TO 4: PLOT INK 3;r+q,15: D
RAW INK 3;0,12: NEXT q: LET r=r+
INT (10+RND*20): NEXT r
1010 PAPER 5: INK 0: REM [illegible]
1015 PRINT AT 21,0; PAPER 4;
1016 PRINT AT 21,11; INK 7;"BUGF
EVER"
1020 LET x=16: LET y=13
1021 PRINT AT x,y; INK 7;"[illegible]"
1023 LET z=10
1026 GO TO 5360
5010 REM [illegible]
5020 FOR n=x-3 TO x-z+(3 AND y>=
25 AND z>3) STEP -1: INK 0+(7 AN
D n>10): BRIGHT 1: PRINT AT n,y;
"[illegible]";AT n+1,y;"[illegible]";AT n+2,y;"[illegible]";AT
 n+3,y;" ": GO SUB 6050
5030 NEXT n
5038 PRINT AT n+1,y;" ";AT n+2,y
;" ";AT n+3,y;" "
5040 FOR p=y TO y+4-(3 AND y>=28
)
5050 PRINT AT n,p;"[illegible]"
5051 IF INKEY$="0" THEN BEEP .01
,0: PRINT AT n,p+3; INK 0;"[illegible]"
5052 IF (SCREEN$ (n,p+4)<>" ") A
ND INKEY$="0" THEN PRINT AT n,p+
3; INK 2;"[illegible]": FOR r=5 TO 1 STEP
-1: BEEP .01,-r: NEXT r: PRINT A
T a,b-1;" ": LET score=score+
sc1: GO SUB 5310
5053 GO SUB 6000
5060 NEXT p
5061 LET time=time-(4 AND z<>3)-
(4/10 AND z=3)
5065 PRINT AT n,p-1;" "
5070 FOR n=x-z+(3 AND y>=26 AND
z>3) TO x: INK 0+(7 AND n>10): P
RINT AT n-3,y+4;"[illegible]";AT n-2,y+4;"
[illegible]";AT n-1,y+4;"[illegible]";AT n-4,y+4;" "
: GO SUB 6050
5080 NEXT n
5085 PRINT AT n-4,y+4;" ";AT n-3
,y+4;" ";AT n-2,y+4;" "
5090 LET y=y+4: PRINT AT x,y; IN
K 7;"[illegible]"
5095 BEEP .01,-20: BEEP .01,-10
5096 IF y>=29 THEN LET time=time
-3: PRINT AT x,y; INK 1;" ": INK
 7: FOR n=1 TO 20: BEEP .003,n:
PLOT 236,32: GO SUB 6050: DRAW I
NT (-10+RND*20),INT (RND*15): NE
XT n: GO SUB 6050: FOR q=16 TO 1
8: PRINT AT q,28; PAPER 1;"
 GO SUB 9120: GO SUB 6050: NEXT
 q: LET x=16: LET y=13
5100 RETURN
5110 REM [illegible]
5120 FOR n=x-3 TO x-z STEP -1: I
NK 0+(7 AND n>10): PRINT AT n,y;
"[illegible]";AT n+1,y;"[illegible]";AT n+2,y;"[illegible]";AT
 n+3,y;" ": GO SUB 6050
5130 NEXT n
5138 PRINT AT n+1,y;" ";AT n+2,y
;AT n+3,y;" "
5140 FOR p=y TO y-4 STEP -1
5150 PRINT AT n,p;"[illegible] ": GO SUB
 6050: POKE USR "3"+4,4
5155 IF INKEY$="0" THEN BEEP .01
,0: POKE USR "3"+4,255
5157 IF (SCREEN$ (n,p-1)<>" ") A
ND INKEY$="0" THEN POKE USR "3"+
4,255: FOR r=5 TO 1 STEP -1: BEE
P .01,-r: NEXT r: PRINT AT a,b-1
;" ": LET score=score+sc1: G
O SUB 5310
5160 NEXT p
5161 LET time=time-(4 AND z<>3)-
(4/10 AND z=3)
5165 PRINT AT n,p+1;"  "
5170 FOR n=x-z TO x: INK 0+(7 AN
```

```
D n>1Ø) PRINT AT n-3,y-4;"U",AT
n-2,y-4, "▲" AT n-1,y-4, ",AT n
-4 y-4, " GO SUB 6050
5180 NEXT n
5185 PRINT AT n-4,y-4; " ",AT n-3
,y-4," ",AT n-2,y-4," "
5190 LET y=y-4  PRINT AT x,y,"▲"
5195 BEEP .01,-20  BEEP .01,-10
5198 IF y<=3 THEN LET time=time-
3  PRINT AT x,y  INK 1." "  INK
7: FOR n=1 TO 20  BEEP .003,n. P
LOT 11,32  GO SUB 6050  DRAW INT
 (-10+RND*20),INT (RND*10)  NEXT
 n  GO SUB 6050  FOR q=10 TO 18
 PRINT AT q,0, PAPER 1." "  GO
 SUB 9110  GO SUB 6050  NEXT q
LET x=16  LET y=13
5200 RETURN
5300 REM [illegible]
5310 LET a=INT (1+RND*7)  LET b1
=INT (1+RND*3)
5320 IF b1=1 THEN LET a$="  "
LET d=-1  LET d1=0  LET b=29  LE
T sc1=150
5330 IF b1=2 THEN LET a$="  "
LET d=-1  LET d1=0  LET b=29  LE
T sc1=200
5340 IF b1=3 THEN LET a$="  "
LET d=1  LET d1=29  LET b=0  LET
 sc1=50
5350 RETURN
5360 GO SUB 5310
6000 GO SUB 6050
6001 PRINT AT 21,0, INK 7;"TIME
",INT time AND time>=0," ",AT 21
,22, INK 7,"SCORE ",score
6002 IF time<=0 THEN LET time=0
 PRINT AT 10,0, INK 7, PAPER 4,"
 GAME-OVER      " GO TO 9000
6005 IF INKEY$="8" THEN LET z=3
 BEEP .01,6  GO SUB 5016
6010 IF INKEY$="7" THEN LET z=x-
a-1  BEEP .01,7  GO SUB 5016
6020 IF INKEY$="5" AND y>1 THEN
LET z=3  BEEP .01,5  GO SUB 5120
6030 IF INKEY$="6" AND y>1 THEN
LET z=x-a-1  BEEP .01,6  GO SUB
5120
6035 LET time=time-1/10
6040 GO TO 6000
6050 PRINT AT a,b, INK 0,a$
6060 LET b=b+d  IF b=d1 THEN PRI
NT AT a,b-1," "  GO SUB 5310
6065 BEEP .001,b
6070 RETURN
9000 IF INKEY$<>"r" THEN GO TO 6
000
9015 PRINT AT 1,12."SCORING",AT
2,12,"-------"
9020 PRINT AT 4,3,"  DRAGONFLI
ES------ 200"
9040 PRINT AT 6,3,"  BUTTERFLI
ES------ 150"
9070 PRINT AT 8,3,"  FLIES----
------- 50 "
9080 FOR n=1 TO 50  NEXT n
9090 IF INKEY$<>"r" THEN GO TO 9
090
9100 FOR n=1 TO 10  PRINT AT n,0
, PAPER 5. INK 7."
           "  NEXT n  PRI
NT AT 21,20, PAPER 4, INK 4,"
 "  PRINT AT x,y," "  LET score=
0  LET z=10  LET x=16  LET y=13
 LET time=61  PRINT AT x,y, INK
 "▲"  GO TO 5360
9110 INK 7  FOR n=0 TO 16 STEP 1
6  PLOT n,32  DRAW 2,1  DRAW 2,-
1  NEXT n  PRINT AT 16,13 "▲"  R
ETURN
9120 INK 7  FOR n=0 TO 16 STEP 1
6  PLOT n+230,32  DRAW 2,1  DRAW
 2,-1  NEXT n  PRINT AT 16,13,"▲"
 RETURN
```

Bug Fever
by Simon Cox

Double Height

on Vic20

The program doubles the height of all the characters on an unexpanded Vic. Although short it can be very useful for display effects

```
10 FOR I = 1 TO 1024
20 B = PEEK ( Y + 32768 )
30 POKE 5120 + X,B
40 POKE 5121 + X,B
50 X = X + 2 : Y = Y + 1
60 NEXT I
70 PRINT CHR$ (147)
80 POKE 36867,155
90 POKE 36869,253
```

Double Height
by Julian Storer

Elements

on BBC

This program should help to remind you of the main features of the first 20 elements

Program notes

40	Asks for Element
60-100	Reads and checks Data
110-230	Main section
240 250	Another run?
280-480	Data

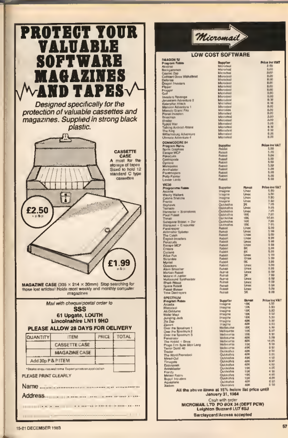
Variables

A$	Element
C	Atomic number
D	Atomic weight
E$	Elements symbol
F$	Electron arrangement
H	Number of electrons
I	Number of protons
G	The atomic group

To return the copy keys back to their copy function type 245 *FX4

```
LIS
  10REM ELEMENTS REVISION
  20*FX4,4
  30MODE 7:VDU23;8202;0;0;0;
  40PRINT"ENTER ELEMENT TO BE REVISED"
  50
  60INPUT B$
  70READ A$,C,D,E$,F$,H,I,G
  80IF A$="Z" THEN 260
  90IF B$=A$ THEN 110
 100IF B$<>A$ THEN 70
 110PRINT'ELEMENT ";A$
 120PRINT"ATOMIC NUMBER ";C
 130PRINT"ATOMIC WEIGHT ";D
 140PRINT' 'What is ";A$;" s symbol ";
 150INPUT J$:IF J$<>E$ THEN PRINT"WRONG.ELEMENT ";A$;" S SYMBOL
    IS ";E$:ELSE PRINT"CORRECT"
 160PRINT  "What is the electron arrangement(start  by ";CHR$(34);"
    and finish with ";CHR$(34);")"
 170INPUT J$:IF J$<>F$ THEN PRINT"ELECTRON ARRANGEMENT:";F$:ELSE
    PRINT"CORRECT'
 180PRINT"How many neutrons in this element"
 190INPUT J:IF J=H THEN PRINT"CORRECT" ELSE PRINT"NO. OF
    neutrons=atomic weight -atomic number.Which is ";H
 200PRINT"How many protons in this element "
 210INPUT J:IF J=I THEN PRINT"CORRECT" ELSE PRINT"no. of
    protons=atomic number. Which is ";I
 220 PRINT"Which group is this element in?";
 230 INPUTJ:IF J=G THEN PRINT"CORRECT" ELSE PRINT"GROUP=no.
    of electrons on the outer shellof the atom
 240PRINT"ANOTHER ELEMENT";
 250J$=GET$:IF J$="Y" THEN CLS:GOTO 40 ELSE END
 260PRINT'ELEMENT IS NOT IN THE FIRST TWENTY      ELEMENTS."
 270PRINT"PLEASE TRY AGAIN";FORO=1 TO 1000:NEXTO:RUN
 280DATAHYDROGEN,1,1,H,"1",0,1,1
 290DATAHELIUM,2,4,He,"2',2,2,2
 300DATALITHIUM,3,7,Li,"2,1",4,3,1
 310DATABERYLLIUM,4,9,Be,"2,2",5,4,2
 320DATABORON,5,11,B,"2,3",6,5,3
 330DATACARBON,6,12,C,"2,4",6,6,4
 340DATANITROGEN,7,14,N,"2,5",7,7,5
 350DATAOXYGEN,8,16,O,"2,6",8,8.6
 360DATAFLUORINE,9,19,F,"2,7",10,9,7
 370DATANEON,10,20,Ne,"2,8",10,10,8
 380DATASODIUM,11,23,Na,"2,8,1",12,11,1
 390DATAMAGNESIUM,12,24,Mg,"2,8,2",12,12,2
 400DATAALUMINIUM,13,27,Al,"2,8,3",14,13,3
 410DATASILICON,14,28,Si,"2,8,4",14,14,4
 420DATAPHOSPHORUS,15,31,P,"2,8,5",16,15,5
 430DATASULPHUR,16,32,S,"2,8,6",16,16,6
 440DATACHLORINE,17,35.5,Cl,"2,8,7",16.5,17,7
 450DATAARGON,18,36,Ar,"2,8,8",18,18,8
 460DATAPOTTASIUM,19,39,K,"2,8,8,1",20,19,1
 470DATACALCIUM,20,40,Ca,"2,8,8,2",20,20,2
 480DATAZ,0,0,X,"0',0,0,0
```

Elements
by Kenneth Adair


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Pre-defined Sounde

on Dragon

This short machine code routine shows what can be done on the Dragon when using machine code. It gives three pre-defined sound effects which are an explosion laser and gunshot. The sounds are accessed by the *Usro* (value) function whose value is a number between 1 and 3. I have included a check sum to check for data errors.

As a final point I have discovered a strange *Rom* routine which deletes all the line numbers from any Basic program. To try it *Exec* 35996

```
10 '##########################
20 '#### Popular Computing ####
30 '####      Weekly      ####
40 '####PRE-DEFINED SOUNDS#####
50 '####BY N.EDMUNDS 1983.#####
60 '####FOR THE DRAGON 32.#####
70 '##########################
80 'USRO(1)=GUNSHOT
90 'USRO(2)=LASER
100 'USRO(3)=EXPLOSION
110 REM CLEAR 200,32000
120 DATA 80,B8,27,5D,27,04,C1,03,23,05,C6,02,7E,83,44,C1,
    01,26,37.34,12,B6,FF.23,8A,08,B7,FF,23,7F,01,47,8E,B7
    98 A6 80,8D 14
130 '
140 DATA A6,90,8D,10,7A,01,47,26,F3,B6,FF,23,84,F7,B7,FF,
    23 35,12,39,84,01,47,B7 FF,20 B6,41,4A,26 FD 39
150 '
160 DATA 12,12,12,12,12,C1,02,26,37,34,32,B6,FF,23,8A,08,
    B7,FF,23,8E 00,01,B6 FD,B7 FF,20,8D,17 7F FF.20.B0,12
    30.01 8C 00 98 25.ED
170 '
180 DATA 84,FF.23,86,F7,B7,FF,23,35,32,39,1F,12,31,3F,26,
    FC,39,12,12,12,12
190 '
200 DATA 12,12,12,12,12,34,12,B6,FF,23,8A,08,B7,FF,23,7F,
    01 47 8E B7 98 A6,80,80,14,A6,80,8D.10,7A,01.47 26 F3,
    B6 FF 23 84,F7
210 '
220 DATA B7,FF,23,35,12,39 B6 01,47,B7,FF,20,86,FE,4A,26,
    FD,39
230 'END OF DATA
240 '##BASIC LOADER FOR CODE#####
250 DATA "END"
260 READ a$:IF a$="END" THEN 320
270 LET x=VAL("&H"+a$)
280 POKE 32000+c,x
290 cs=cs+x
300 c=c+1
310 GOTO 260
320 IF cs()19623 THEN PRINT"DATA ERROR.":STOP
330 DEF usr0=32000
340 PRINT"GUNSHOT=USRO(1)"
350 FOR d=1 TO 300:NEXT d
360 a=usr0(1)'1=LASER.
370 PRINT"LASER=USRO(2)"'2=LASER.
380 FOR d=1 TO 300:NEXT d
390 a=usr0(2)
400 PRINT"EXPLOSION=USRO(3)"
410 FOR d=1 TO 300:nextd
420 a=usr0(3)'3=EXPLOSION.
430 '#################################
User functions:-
USRO(1)=Gunshot sound.
USRO(2)=Laser sound.
USRO(3)=Exolosion sound.
```

Pre-defined sounds
by N Edmunds

Telephone

on Spectrum

This program is a menu-driven user-friendly telephone directory for either model of Spectrum. The 48K Spectrum will allow for about 600-700 entries. The necessary alterations for 16K are included below. To alter the program for n entries

Line 200 to	200 Dim L$ (n 32)
Line 2060 to	2060 For A = 1 to n
Line 2143 to	2143 For A = 1 to n
Line 5050 to	5050 For A = 1 to n

Program notes

20	Colours
28	Poke Caps Lock.
40-90	Print menu.
200 230	Variables
1000-1100	ADD an entry routine
2000 2100	DELETE an entry routine
3000-3000	SEARCH for an entry routine
4000	EXIT from program
5000-5030	LOAD a file
6000-6030	SAVE a file

Variables

A	Search delete loops
L =	Entry number
A$ =	Menu List.
D$ =	Entry to be added to list.
E$	Entry to be erased
L$ (n,32) =	List of n entries each of 32 characters
Q$ =	Entry to be searched for
Y$ =	File to be Saved/Loaded

```
   0 REM **************************
   5 REM * TELEPHONE DIRECTORY *
  10 REM * © D. HARRISON 1983 **
  12 REM **************************
  20 BORDER 0  PAPER 0  INK 7  C
LS
  30 POKE 23658,8
  35 GO SUB 200
  40 PRINT TAB 5,"TELEPHONE DIRE
CTORY"  RESTORE
  50 PRINT   PRINT
  60 FOR A=1 TO 6  READ A$
  70 PRINT AT A*3,6,A,AT A*3,9,A
$
  85 NEXT A
  90 DATA "ADD A NUMBER","DELETE
 A NUMBER","SEARCH","EXIT PROGRA
M","LOAD A FILE","SAVE A FILE"
 100 LET I$=INKEY$  IF I$="" THE
N GO TO 100
 110 IF I$<>"1" AND I$<>"2" AND
I$<>"3" AND I$<>"4" AND I$<>"5"
AND I$<>"6" THEN GO TO 100
 120 LET GOTO=CODE I$-48
 130 GO TO (GOTO*1000)
 140 STOP
 200 DIM L$(500,32)
 210 LET L=1
 220 DIM Z(100)
 230 LET ZZ=1
 999 RETURN
1000 CLS   PRINT TAB 8,"TELEPHON
E DIRECTORY";AT 2,0,"1. ADD A NU
MBER."
1010 PRINT   PRINT 'PLEASE TYPE
IN THE ENTRY YOU    WISH TO ADD
TO THE DIRECTORY ANDTHEN PRESS
ENTER'.'
1020 INPUT D$
1030 IF LEN D$>32 THEN PRINT AT
9,0, FLASH 1,'SORRY, YOUR ENTRY
IS TOO LONG.  MAXIMUM LENGTH ALL
OWED IS 32    CHARACTERS.
"  GO TO 1020
1040 PRINT AT 13,0,"IS THIS ALL
O.K. ?",AT 15,0,D$,AT 17,0,"IF N
OT, THEN PRESS 'N' AND YOU  WILL
 BE TRANSPORTED BACK TO THE MENU
, PRESS 'Y' TO ADD THIS    ENTR
Y TO YOUR DIRECTORY.'
1050 IF INKEY$="" THEN GO TO 105
0
1060 IF INKEY$<>"Y" AND INKEY$<>
"N" THEN GO TO 1050
```

```
1070 IF INKEY$="N" THEN CLS : GO
 TO 40
1080 IF INKEY$="Y" THEN LET L$(L
, TO LEN D$)=D$: LET L=L+1
1090 CLS : PRINT TAB 5,"TELEPHON
E DIRECTORY"
1100 PRINT : PRINT : PRINT "ENTR
Y SUCCESSFUL !!!",AT 8,0,"PRESS
ANY KEY TO CONTINUE." PAUSE 0:
CLS : GO TO 40
2000 CLS : PRINT TAB 8,"TELEPHON
E DIRECTORY" PRINT
2010 PRINT "2. DELETE AN ENTRY"
2020 PRINT : PRINT : PRINT "TYPE
 IN AS MUCH AS YOU KNOW OF THE
ENTRY WHICH YOU WISH TO     ERAS
E."
2030 INPUT E$
2040 IF LEN E$>32 THEN PRINT AT
6,0, FLASH 1,"SORRY THIS IS TOO
LONG FOR THIS PARTICULAR DIRECTO
RY, PLEASE TRYAGAIN.
                  " GO TO 2030
2050 CLS : PRINT TAB 8,"TELEPHON
E DIRECTORY": PRINT : PRINT
2060 FOR A=1 TO 500
2065 LET LEN1=LEN E$
2070 IF L$(A, TO LEN1)=E$ THEN P
RINT L$(A, TO LEN L$(A)): LET Z(
ZZ)=A
2080 NEXT A
2090 PRINT "END OF SCRN."
2100 PRINT : PRINT "DO YOU WISH
TO ERASE THESE       ENTRIES ?"
2110 PRINT : PRINT "TYPE 'Y' FOR
 YES, 'N' FOR NO."
2120 IF INKEY$="" THEN GO TO 212
0
2130 IF INKEY$<>"Y" AND INKEY$<>
"N" THEN GO TO 2120
2140 IF INKEY$="N" THEN CLS : GO
 TO 40
2142 PRINT : PRINT "DELETING "
2143 FOR A=1 TO 500
2145 IF L$(A, TO LEN1)=E$ THEN L
ET L$(A)=""
2150 NEXT A
2160 PRINT : PRINT "ENTRIES ERAS
ED." PRINT : PRINT "PRESS ENTE
R' TO CONTINUE."
2190 INPUT K$: CLS : GO TO 40
3000 CLS : PRINT TAB 8,"TELEPHON
E DIRECTORY" PRINT : PRINT
3010 PRINT "3. SEARCH." PRINT
 PRINT
3020 PRINT "INPUT THE ITEM YOU W
ISH TO       SEARCH FOR."
3030 INPUT O$: CLS
3040 LET US=LEN O$
3050 FOR A=1 TO 500
3055 LET F$=L$(A)
3060 IF F$( TO LEN O$)=O$ THEN P
RINT L$(A)
3070 NEXT A
3080 PRINT : PRINT "SCAN COMPLET
ED." PRINT : PRINT "PRESS ANY K
EY TO CONTINUE." PAUSE 0: CLS
 GO TO 40
4000 CLS : STOP
5000 CLS : PRINT TAB 8,"TELEPHON
E DIRECTORY" PRINT : PRINT
5005 PRINT "5. LOAD A FILE." PR
INT : PRINT
5010 PRINT "PLEASE TYPE IN THE N
AME OF THE  FILE WHICH YOU WISH
TO LOAD."
5020 INPUT Y$
5030 PRINT : PRINT : PRINT "STAR
T THE TAPE AND THEN PRESS   AN
KEY" PAUSE 0: LOAD Y$ DATA L$()
  CLS : GO TO 40
6000 CLS : PRINT TAB 6,"TELEPHON
E DIRECTORY": PRINT : PRINT "6.
SAVE A FILE." PRINT : PRINT "PL
EASE TYPE IN THE NAME OF THE  FI
LE."
6010 INPUT Y$
6020 SAVE Y$ DATA L$()
6030 CLS : GO TO 40
```

Telephone
by David Harrison

Cobwebs

on Dragon

This program will produce a series of cobweb effects going through the five graphic modes on the Dragon

Program notes

10-30	Prints title
40-50	Defines the mode and sets up the screen
60	Starts loop for drawing cobwebs
70-90	Checks how cobwebs are to be drawn
100-150	Draws cobwebs
160-170	Pause in program, clears screen
180-190	Repeat until the loop is finished

```
10 CLS:PRINT@203,"cobwebs"
20 FOR XX=1 TO 2000
30 NEXT XX
40 FOR S=0 TO 4
50 PMODES,1 PCLS:SCREEN1,1
60 FOR KK=4 TO 16 STEP 4
70 IF KK=12 OR KK=20 THEN 90 ELSE 80
80 FOR A=0 TO 255 STEP KK:GOTO100
90 FOR A=255 TO 0 STEP -KK
100 Y=FIX(A*191/255)
110 LINE(0,Y)-(A,191),PSET
120 LINE(A,191)-(255,191-Y),PSET
130 LINE(255,191-Y)-(255-A,0),PSET
140 LINE(255-A,0)-(0,Y),PSET
150 NEXT A
160 FOR O=1 TO 2000:NEXTO
170 PCLS
180 NEXT KK
190 NEXT S
```

Cobwebs
by J Blatch

Cell Attack

on Vic20

The object of the game is to stop the chromosomes germs etc from breaking through the spongy layer of the cell To stop them, control your miniaturised culture dish using keys < left > right Simple? Just ask your white blood cells what they do every day?

Program notes

1 90	Initialisation.
30-78	Titles Page
80-92	Set up Screen 1
110 190	Select alien type
170-230	Move alien
240-350	Explosion and End page
1000-1050	Movement left/right.
2000 2020	Sound
5000-5070	Hi res
6000	Screens 2/3.

```
0 REM BY G.CARROTT
1 HI=0 W=30 POKE36878,15 GOSUB5000
5 V=36878 POKE650,126
10 PRINT"J" POKE36879,156 C=30720 SA=7993
20 SC=0
30 PRINT"       CELL ATTACK      ",
40 PRINT"  STOP THE CHROMOSONES  ENZYMES,
GERMS,POLYPS  AND ANTIBODIES FROM"
50 PRINT" ATTACKING YOUR CELLS  IF THEY BR
EAK INTO    YOUR CELL YOURE DEAD"
60 PRINT"  ATTACKER=      CONTROLS"
70 PRINT"  -CHROMOSONE    -LEFT"
71 PRINT"  -ENZYME        -FIGHT"
72 PRINT"  -GERM"
73 PRINT"  -POLYP      HI="HI
74 PRINT"  -ANTIBODY"
75 PRINT"  HIT SPACE TO CONTINUE"
76 GETA$ IFA$<>" "THEN76
78 FORI=1TO22 PRINT FORT=1TO20 NEXT NEXT
79 PRINT"J" POKE36869,255
80 PRINT"                         ",
81 PRINT"FGFGFGFGFGFGFGFGFGFGFFFFFFFFFF
FFFFFFFFFF'
82 PRINT"IIIIIIIIIIIIIIIIIIIIII"
90 PRINT"IIIIIIIIIIIIIIIIIIIIII"
91 PRINT"  "SC"    "
92 REM
100 U=INT(RND(1)*5)+1
101 IFSC>50ANDSC<56THENGOSUB6000
102 IFSC>100ANDSC<1006THENGOSUB9000
110 ONUGOTO120,130,140 150,160
115 GOTO100
120 X=1 CL=2 G=1  GOTO170
130 X=3  CL=2 G=2  GOTO170
140 X=2 CL=6 G=4  GOTO170
150 X=4 CL=0 G=6  GOTO170
160 X=5 CL=4 G=10
170 D=7702
171 F=INT(RND(1)*18)+2
175 POKED+F X POKED+F+C,CL
176 D=D+F D1=D+F+C
185 GOSUB1000
186 PRINT"                         "SC"
"HI,
187 POKESA,0
188 POKE36875,175 FORDE=1TOW NEXT POKE3687
5,0 W=W-0.25 IFW<1THENW=1
190 D=D+22 D1=D+C+22
195 POKED X POKED1,CL
200 POKED-22,32
210 IFPEEK(D+22)=0THENPOKED,32 SC=SC+(6-U)
GOSUB2000 GOTO100
220 IFPEEK(D+22)=6ORPEEK(D+22)=7THENPOKED
32 POKED+22,32 GOTO100
230 IFPEEK(D+22)<>9THEN105
239 POKE36863 240
240 PRINT"          BOOM!"
241 IFSC>HITHENHI=SC
250 POKEV 15
255 POKE36877,128
260 FORL=15TO0STEP-.015 POKE36878,L NEXT F
OKE36877 0
266 PRINT"J"
269 FORT=1TO8
270 POKE36879 126
275 E$="      "
276 X=INT(RND(1)*7)+1
277 D$=MID$(E$ X,1)
278 PRINTD$
280 PRINT"     CELL ATTACK"
291 NEXT PRINT" "
290 PRINT" YOU AMASSED A SCORE   OF" SC
300 IFSC>HITHENHI=SC
310 PRINT" THE HI-SCORE IS" HI
320 PRINT" ANOTHER GAME(Y/N)"
330 INPUT"     ",A$
340 IFA$="Y"THEN5
350 X=INT(RND(1)*255)+1 POKE36879,X END
1000 GETA$ IFA$=" "THENSA=SA-1 POKESA+1 32
1010 IFA$="."THENSA=SA+1 POKESA-1 32
1020 IFSA<7988THENSA=7938
1030 IFSA>9008THENSA=8009
1040 POKESA,0 POKESA+C 0
1050 RETURN
2000 POKEV 12
2010 POKE36876,150+(U*6)
2020 FORDE=1TO100 NEXT POKE36876,0 RETURN
5000 POKE56 28 POKE52 29
5001 PRINT"     DON T WORRY THIS IS   NOT
ABREAKDOWN.....    WAIT A MOMENT "
5010 FORI=7168TO7673 POKEI PEEK(I+25600) NE
XT
5020 FORI=7168TO7255 READA POKEI A NEXT
5030 RETURN
5040 DATA0 0,0,255,165,36,36,0,36,36 60,255
,36,66 66 165 108,16,16 16 56,16 16 16
5050 DATA165,66 165 24,24 165 66,129,162,68
,52 136,72,40,16,16 65 73,93,119,93,8 8 8
5060 DATA58,238 187 238 187,238,187 238 0,0
0 0,65,170 85,255 0,0,0 0,0,0,0,0
5070 DATA255 255 255 255,255,255 255,255 36
,24,90 129 60,66,153 165
6000 REM MAKE BREAK
6001 POKE36879 152
6010 PRINT "                    FGFGFGFGFG
FGFGFGFGFGIIIIIIIIIIIIIIIIIIIIII'SC,HI
6020 PRINT'IIIIIIIIIIIIIIIIIIIIII'
6030 RETURN
9000 POKE36879 154
9010 PRINT"                    IIIIIIIIIII
IIIIIIIIIII"SC HI
9020 PRINT"IIIIIIIIIIIIIIIIIIIIII' RETURN
READY.
  BECAUSE THIS PROGRAM WAS LISTED
  ON A PET PRINTER,THE CONTROL
   SIGN FOR RED COMES OUT AS ■
```

Cell Attack
by G Carrol

Dual

on BBC

Dual is a program for two players. It should work on either A or B. The idea of the game is to destroy your partner ten times as you move left and right.

Program notes

10 — 160 Instructions
170 — 260 Initialise all variables
270 — 360 Defined characters
370 — 510 Print score and cowboys
520 — 600 Input and move cowboys
610 — 680 Prevents move off screen
690 — 920 Moves bullets
930 — 1030 Would you like another game?

```
10 MODE 7
20 CLS
30 PRINT"                  DUAL"
40 PRINT"                  ****"
50 PRINT" TSCORE=THE TOP MANS SCORE."
60 PRINT" BSCORE=THE BOTTOM MANS SCORE."
70 PRINT
80 PRINT" THE IDEA OF THE GAME IS TO
   DESTROY YOUR OPPONENT BY HITTING HIM
   TEN TIMES."
90 PRINT
100 PRINT"KEYS:"
110 PRINT"TOP MAN= Z=LEFT  X=RIGHT
    A=FIRE"
120 PRINT"BOTTOM MAN= ,=LEFT  .=RIGHT
    ;=FIRE"
130 PRINT
140 PRINT"          (HIT A KEY TO BEGIN)"
150 B$=GET$
160 IF B$=""THENGOTO 160
170 SC=0:S=0
180 CLS
190 COLOUR 131
200 MODE 2
210 X=5
220 Y=1
230 Z=10
240 C=28
250 COLOUR 131
260 CLS
270 VDU 23,248,0,0,60,60,255,255,255,255
280 VDU 23,249,60,60,60,60,60,60,60,60
290 VDU 23,240,56,254,124,146,238,254,
    198,124
300 VDU 23,241,56,124,186,186,186,84,
    56,56
310 VDU 23,242,40,40,40,40,40,40,108,0
320 VDU 23,243,56,254,124,146,238,
    254,198,124
330 VDU 23,244,56,124,186,186,186,
    84,56,56
340 VDU 23,245,40,40,40,40,40,40,108,0
350 VDU 23,250,24,24,24,219,219,219,
    255,255
360 VDU 23,251,24,24,24,24,60,126,0,0
370 COLOUR 2
380 PRINTTAB(0,0);"TSCORE:";S
390 PRINTTAB(11,0);"BSCORE:";SC
400 COLOUR 1
410 PRINTTAB(X,Y);" ";CHR$240;" "
420 PRINTTAB(X,Y+1);" ";CHR$241;" "
430 PRINTTAB(X,Y+2);" ";CHR$242;" "
440 PRINTTAB(Z,C-2);" ";CHR$243;" "
450 PRINTTAB(Z,C-1); " ";CHR$244;" "
460 PRINTTAB(Z,C);" ";CHR$245;" "
470 COLOUR 2
480 PRINTTAB(3,15);CHR$250
490 PRINTTAB(3,16);CHR$251
500 PRINTTAB(14,17);CHR$250
510 PRINTTAB(14,18);CHR$251
520 A$=GET$
530 PRINTTAB(0,0);"TSCORE:";S
540 PRINTTAB(11,0);"BSCORE:";SC
550 IFA$="Z"THENX=X-1:GOTO 610
560 IFA$="X"THENX=X+1:GOTO 610
570 IFA$=";"THENGOTO690
580 IFA$="."THENZ=Z+1:GOTO 650
590 IFA$=","THENZ=Z-1:GOTO650
600 IFA$="A"THENGOTO 760
610 IFX=0THENX=X+1
620 IFX=19THENX=X-1
630 COLOUR 1
640 GOTO 410
650 IFZ=0THENZ=Z+1
660 IFZ=19THENZ=Z-1
670 COLOUR 1
680 GOTO 410
690 FORT=26TO0STEP-1
700 PRINTTAB(Z+1,T-2);"."
710 FOR DELAY=1 TO 10:NEXT DELAY
720 PRINTTAB(Z+1,T-1);" "
730 NEXT T
740 IFX=Z AND  A$=";" THENGOTO830
750 GOTO 410
760 FORP=4TO27
770 PRINTTAB(X+1,P);"."
780 FORDELAY=1TO10:NEXTDELAY
790 PRINTTAB(X+1,P);" "
800 NEXT P
810 IFZ=X AND A$="A" THENGOTO 880
820 GOTO 410
830 PRINTTAB(X+1,Y);CHR$248
840 PRINTTAB(X+1,Y+1);CHR$249
850 SC=SC+1:IFSC=10THENGOTO930
860 FORT=1TO2000:NEXTT
870 GOTO 290
880 PRINTTAB(Z+1,C-1);CHR$248
890 PRINTTAB(Z+1,C);CHR$249
900 S=S+1:IFS=10THEN930
910 FORT=1TO 2000:NEXTT
920 GOTO290
930 CLS
940 MODE 7
950 PRINT"                 WELL DONE!"
960 PRINT"                 **********"
970 PRINT" YOU SHOT YOUR OPPONENT
    TO PIECES"
980 PRINT"  WOULD YOU LIKE ANOTHER
    GAME Y/N?"
990 C$=GET$
1000 IFC$="Y"THENGOTO20ELSEGOTO1010
1010 CLS
1020 PRINT"BYE-BYE HOT SHOT!"
1030 END
```

Dual
by Martin Rushton

Averagee

on Spectrum

The program is called "averages" and I use it to work out mean and modal averages. It is written for the ZX Spectrum (either model) but should prove easy to convert to run on most other Basics. At the start of the program you will be asked how many numbers you wish to compare. Next you type in those numbers (entering each number in turn using *Enter*). Finally the computer will print a list of the numbers entered followed by the modal average (if there is one), the number of times it appears and the mean average. The option for a printout is included.

Program notes

100-200	Allows for the inputting of numbers and sets up the variables
210-250	Compares numbers inputed to see if any are the same
260-290	Finds mode (greatest value of d)
300-370	Prints numbers, mode and the number of times that the mode appears
380-420	Works out and prints mean
425-470	Options available
500-590	Printout.

```
100 REM AVERAGES BY SIMON SMITH
1983
110 BORDER 0: PAPER 0: INK 7: C
LS
120 INPUT #0,"How many numbers
in calculation (Type number then
press ENTER) ?",a
125 IF a=1 THEN GO TO 120
130 DIM a(a)
140 FOR n=1 TO a
150 INPUT a(n)
160 NEXT n
170 DIM c(a+1)
180 FOR n=1 TO a+1
190 LET c(n)=0
200 NEXT n
210 FOR m=1 TO a
220 FOR n=1 TO a
230 IF a(m)=a(n) THEN LET c(m)=
c(m)+1
240 NEXT n
250 NEXT m
260 LET d=c(1)
270 FOR n=1 TO a
280 IF c(n)>d THEN LET d=c(n):
LET mode=a(n)
281 IF c(n)=d THEN LET d=1
290 NEXT n
300 PRINT "The numbers inputted
were.......": PRINT : PRINT
310 FOR n=1 TO a
320 PRINT a(n)
330 NEXT n
340 PRINT : PRINT
360 IF d=1 THEN PRINT "There is
no single mode": GO TO 380
365 PRINT "The mode is ",mode
370 PRINT "It appears ";d;" tim
es"
380 LET total=0
390 FOR n=1 TO a
400 LET total=total+a(n)
410 NEXT n
420 PRINT : PRINT : PRINT "The
mean is ",total/a
425 PRINT #0;"HIT ANY KEY TO CO
NTINUE": PAUSE 0
430 INPUT "Press y-for a printo
ut of this screen r-to input ne
w numbers  e-to exit the progra
m.Then pressENTER ",a$
450 IF a$="y" THEN GO SUB 500:
GO TO 430
460 IF a$="e" THEN STOP
470 IF a$="r" THEN GO TO 100
480 GO TO 430
500 LPRINT "The numbers inputte
d were.......": PRINT : PRINT
510 FOR n=1 TO a
520 LPRINT a(n)
530 NEXT n
540 LPRINT : LPRINT
550 IF d=1 THEN LPRINT "There i
s no single mode": GO TO 580
560 LPRINT "The mode is ",mode
570 LPRINT "It appears ",d;" ti
mes"
580 LPRINT : LPRINT : LPRINT "T
he mean is ",total/a
590 RETURN
```

Averages
by Simon Smith

Microradio

GW6JJN

Broadcasting

This week I would like to mention another kind of radio: the broadcast radio. The BBC and IBA to be exact. Microradio has so far only dealt with the amateur and CB kind radio, but you can't keep a good thing down and the big boys are getting into the act.

Radio West in the Bristol area now has an extremely large audience for their *Datarama* programme. They transmit a microshow which discusses aspects of computing and then, late at night when only the computer freaks are about, they transmit computer programmes (the kind you *Load*). This ghastly noise can be heard in the small hours on the FM and medium wave bands for Spectrum and BBC computers. All that is needed is the trusty radio cassette recorder and there are programs to be had for free. I must add that the disc jockeys do not talk over the intro as they do on pop records much to the frustration of some.

The word is spreading and now Radio Victory is at it. They are sending *Screens* over the air with their logo and that of a certain software company not a million miles from Portsmouth, shades of Pimania no less.

As if this was not enough, BBC Radio Wales is the latest candidate vying for the poor micros time. On Fridays at 6.30 pm they have their own computer programme and will be transmitting the *Loading* kind as well. These will be in Basic for most microcomputers (and, I expect, Welsh for the Dragon). Radio Wales transmits its broadcasts and funny noises on 882Khz in the medium wave.

All of this has been too much for me, I don't get enough sleep as it is. There is a rumour that I have been seen coming and going about the studios of Swansea Sound Radio. I have always had a hankering to be a floppy disc jockey, so who knows, but that's another story.

A quick word for all those lucky people who live in the Duchy of Cornwall. The Cornish Amateur Radio Club now has a computer section devoted to the likes of us. I attended one of these meetings a while ago and was very impressed. Radio computing is becoming very popular down in the southwest where most people have BBC micros, as I understand. Local listeners who cannot understand conversations on the amateur bands emanating from the Cornwall area can now be told that *The Philosophers Quest* has been solved and the region is back to normal.

One point, please note that information about the Cornish Club can be obtained from Simon Rodda on Penzance 3948. A second point is that when writing to the addresses I give in this column, a stamped addressed envelope will always bring a reply. It is common courtesy after all. ●

Ray Berry GW6JJN

This series of articles is designed for radio and microcomputer enthusiasts alike. If you have any queries that you want answered, hints and tips to share, or topics that you would like to see covered write to Ray Berry, Microradio, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2H 3LD.

Number one

I have a letter this week from Blair McGlashan of Swanley in Kent. He has a few tips for you to try out while playing *The Hobbit*.

"You may have noticed," he writes, "how the rope may be used for getting the torches in the goblin's cavern and the elvenking's hall by tying the torch and then taking the rope. You now carry the rope, with the torch tied to it."

Another anomaly that Blair has noticed is that the barrel can be used to carry objects that would otherwise be too heavy to carry. Now, says Blair, the player is able to use this in order to take any object that is mentioned in the program's description of each location. Thus, should you wish, for some strange reason, to collect the curtain at Beorn's House, go about it this way:

TIE CURTAIN
OPEN BARREL (you will, of course, have to have the barrel!)
PUT ROPE IN BARREL (ditto the rope!)
EMPTY BARREL
UNTIE ROPE

Now, if you ask the computer for an inventory, you should find that you are carrying the curtain. This can be repeated for any inanimate object present at any of the locations, the only stumbling-block being that only that object may be carried.

Blair also throws some light on the 'Barrelbug' that many of us have noticed — the one that causes the program to crash or freeze when you try to climb into the barrel. He points out that in order to climb into the barrel, the adventurer will probably have taken it beforehand. And you cannot, logically, be in something if you are also carrying it — so the computer locks up.

Finally, while talking of barrels, Blair says: "We see so much today about graphic adventures — and I would argue that this trend has been largely instigated by *The Hobbit*. Some of the serious adventurers among us wonder whether this is a good thing? When I first bought *The Hobbit*, I was impressed by the very good graphics, but the novelty soon wears off and the pictures begin to spoil the game by ruining one's own conceptions, which can be exceptionally vivid. I remember reading that each picture takes up approximately 500 bytes, and there are at least 20 pictures in this 10K of space. *The Hobbit* could have had many more locations, such as the eagles eyrie, and characters."

I'm in two minds about this subject — I love the pictures of *The Hobbit* and, as they are based on Tolkien's original illustrations, they are from the horse's mouth! However, it does get a bit annoying when, for the thousandth time, the goblin's dungeon is S-L-O-W-L-Y drawn. The Mysterious Adventures from Channel 8 (which I can recommend as good text adventures) contain superb Hobbit-like graphics. But at a key-press they can be turned off until called back. In fact, in order to see what objects are at the location, the picture has to be wiped from the screen, which will then reveal the information.

I don't know if *The Hobbit*, beloved though it is of us adventurers in the UK, "largely instigated" the current vogue for graphics in text adventures. After all, the Spectrum, let alone *The Hobbit*, has made little impression in the States so far.

From Southern Lapland, Gunnar Thander writes: "I am glad to say that the first adventure I bought was *The Hobbit*. This definitely made me mad (a micro-adventurer). Have you ever thought about the importance of trying a good, and I mean good, adventure the first time? I think 'old' adventurers really should try to show 'beginners' the good adventures."

We, the Grand Elf and I, try our best in this column, Gunnar, to bring you up to date with new adventures and also (and very importantly), to retain interest in the old favourites ... and don't forget to keep an eye on the *New Releases* spot, where Graham Taylor will advise you on the latest programs.

Gunnar continues: "Being non-English, every time I begin a new adventure I actually face two adventures. The first is the program itself, the second one is the English language!"

Gunnar and his two sons have finally completed *The Hobbit*. If the Thander household is feeling a bit lost and wondering what to try now, there is *Valhalla* awaiting them. As I write, this program is number one in the software best-seller charts and Legend, its authors, claim that the adventure will have done one million pounds worth of business by Christmas, which is very well deserved. I'll be looking in more detail at this program later, but for now it is gratifying to see that this stunning adventure is getting recognition.

While on this subject, let me move on to a letter I have received from George Walls of Raynes Park in London. George is 69 (which must make him eligible for a senior adventurer award!). He rescued a Spectrum from his daughter, who was about to throw the thing out of a window. George doesn't say which adventure she was playing, but he has now given it a diet of *Valhalla* which it seems to like very much.

"I never cease to admire and wonder at the programmer's skill ... I also play *The Hobbit* but, for me, it cannot hold a candle against *Valhalla*. Like the Grand Elf, and Graham (*New Releases*) Taylor, George has noticed that the program has a unique reaction to the casual swear-word! He finishes: "At 69 I must be in my second childhood. I once started *Valhalla* at 11.30 am and finished at 1 am the following morning." I hope you have many more happy hours with this wonderful adventure, George!

The Hobbit Hall of Fame

Steve Redhead (I do mention *Golden Apple*, Steve, and I agree, it is very good), *Wayne Greaves*, *Kevin Marsh* and *Peter Bywater*, who says that he managed it despite not being one of those unfortunates who can go round *Manic Miner* 20 times before the program has loaded, or thrash the life out of *Orbiter* with the telly off! I know how you feel, Peter — even after reading all the letters in *Popular Computing Weekly* about how to beat *Manic Miner* and the others (what is the point, then, of playing them, I wonder), I still can't get past Eugene!

Incidentally, Peter, your observations about the various objects, such as the golden key, the curious map and so on, are a little off target. You'll find the adventure harder to complete without them.

J Pearson with 92.5 percent (and, no, you are certainly not the only one to have bought *Valhalla*), *Mike Docherty*, *Alan and Daphne Davis*, *Daniel Pitcher*, *Stuart Wedgwood* (who has also scored a magnificent 400 points in Crystal's fantastic *Halls of the Things*) and finally *Jason Turtle*, who has completed *The Hobbit* in four moves!

To finish this week, a couple of pleas for help in Acornsoft's *Castle of Riddles*. Mark Richards, with a grand score of four, would like to know how to progress past the wishing well, having met the bear, seen the mirror and the blood-sucking creature. Also, what does *G L O O P* mean? Are these the letters on the wall of the corridor of doom, Mark? If so, try going *Up* from the courtyard, standing in front of the safe, and *Saying* the word. You could also try getting the bucket from the well (and persevere, it may not come up the first time).

Andrew Goodall is also stuck in *Castle of Riddles*, at the top of the pinnacle after the shooting gallery. Is there a magic word, or does he need a rope? He is also stuck in Digital Fantasia's *Time Machine* — how can he get out of the secret room underneath the desert?

In the near future I hope to be looking at some very interesting adventures that come, like *The Hobbit*, complete with novels. ■

This series of articles is designed for novice and experienced Adventurers alike. Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter. So if you have an Adventure you want reviewed, or if you are stuck in an Adventure and cannot progress any further, write to Tony Bridge, Adventure Corner, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD.



LIGHT CONTROL

B A Cummins of Cloonacnoose Road, Crumlin, Dublin, writes

Q I own a Vic20 and would like to control lights, etc, through it. How is this done and is there a book on the subject?

A This can be done, but you will need a relay of some sort The Vic will not have enough power to drive a mains relay directly, which means that you will have to use a transistor-driven relay to cope with the low voltage If you want to use a static relay from the mains, then you will have to take care to isolate the extra mains power supply that would be needed

As far as I know, there are only two books on the subject, *20 Simple Electronic Projects for the ZX81, Spectrum and other Computers* by Stephen Adams, which is heavily orientated to the Sinclair computers, but it carries a lot of useful general information, and *Simple Interfacing Projects* by Owen Bishop, which is more comprehensive and is not tied to a particular computer, but is more difficult to understand

ASCII AND ANSI

Ian Carleton of St Leonards Hill, Windsor, writes

Q I am new to computing and am getting my first computer for Christmas (an Acorn Electron) What is the difference between Ascii and Ansi? Does the Electron have them and does it need them?

I do not know if you have answered this before, but I have seen the words a lot and would like to know because they seem important

A The Electron has Ascii but not Ansi Ascii stands for *American Standard Code for Information Interchange* It is an agreed way of coding the main characters that a computer uses Thus, a capital letter A has a code of 65 whether it is used on an Electron Commodore 64, Spectrum, or any of the other common computers

Although most computers augment the standard by adding their own characters to other code numbers, the main numbers and symbols remain the same This is very important when it comes to enabling two computers to talk to each other

Ansi is slightly different It stands for *American National Standards Institute* and is a dialect of Basic The Electron does not use this dialect, instead it uses a similar one to the common Microsoft Basic Microsoft is used on the Commodore, Dragon and Oric, to name but a few

DSDICATED UNIT

H Jenkins of Salford writes

Q What is the difference between a monitor and a television?

A Essentially, the difference is that one is a dedicated unit and the other is not A television was not made specifically to receive a signal from a computer — therefore, it contains a lot of circuitry for the decoding and presenting of pictures that have been transmitted over the air Thus, any signal going into the set via the aerial socket is processed electronically and decoded before it comes on to the screen All very necessary for a broadcast signal, but equally unnecessary for the signal produced by a computer

The modulator has to turn the video output from the computer into UHF so that it can be sent into the television, via the aerial socket All this electronic manipulation of the signal causes interference, resulting in a loss of clarity

A monitor does not have any of the circuitry for decoding television signals As long as the computer has the correct output, usually RGB (Red Green Blue) or composite video, then the monitor will accept this With less electronic processing, there is a clearer signal

BLACK AND GREEN

Lee Millset of Paradise Street, Warwick, writes

Q I have recently purchased a Vic It suits my needs very well, except when using the colour black in large blocks or as a screen border colour. In the case of large blocks, the screen distorts in the middle When using black as a screen colour, the tv flickers uncontrollably and even fiddling with the tuning does not help. I have to turn off the computer to restore the picture.

Could you tell me if this is a computer fault? It works perfectly with a mono set

B P Knox of Garden Way, Littlesborough Lancs, also writes

I own a Vic20, unexpanded, and it is faulty (I used another Vic to check). When using a black border I lose all green characters, which turn white, while cyan and yellow go pale Can you tell me what is causing this?

I have been on to Commodores and they say they have not heard of the problem before

A I have met this problem before, though I have never tackled it I am surprised that Commodore have never met it at all I have not got a definite answer, but one possible solution was offered to me by Stephen Adams

Most probably, the problem lies in the Vic (Video Interface Chip), or the associated discreet circuitry The phasing for the colour green is also the reference phasing for the other colours, so while a different phase means a different colour, it is green from which they take their standard In addition, black is in fact off — no signal Therefore if you are using black and green you are in effect just switching the colour on and off

If you have tried retuning your television and failed, then it is probable that there is a small problem in the video circuitry Usually this would cause no trouble but when black and green which are constantly switching the screen display on and off, are used together, then this might well serve to exacerbate any faults

In Lee's case it would seem as if the problem is that the Vic chip needs to action the Restart because it is going off phase This happens when you power up I am afraid that I can offer little help in fault finding, particularly if the problem comes from within the Vic chip itself

I am afraid that all I can say is return your computer if it is still under guarantee

WHAT IS A RADIAN?

David Grennel of Banbury, Oxfordshire, writes

Q I have a Spectrum, but the question I want to ask is not about the Spectrum in particular I would like to know what a radian is Never a whizz at maths, I do, however, know a little bit about geometry, but I am sure I never met radians

Could you explain — is it a set number of degrees or is it a fraction of pi?

A Radians can be expressed in terms of pi, but this is not the way a radian is established There is a clue in the name, radian and the source, radius In formal terms, a radian is 'the angle subtended at the middle of the circle by an arc the length of a radius of that circle'

Imagine a circle of two centimetres, draw the radius From where it reaches the edge of the circle draw an arc the length of the radius in this case 2cm From there draw a second radius The angle made by these two is one radian

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SCRABBLE, brand new in box half price £8 Write 15 Frome East Tilbury Essex RM18 8TD

PRINTER, TELETYPE MODEL 33, complete with papertape punch reader and floorstand can be seen working Ideal for conversion to computer printer £40 Tel Hemel Hempstead (0442) 67918 (after 6 pm)

FOR SALE, Bug-Bytes Vic Panic original cassette hardly ever used accept £6 or swap for Another Vic in the Wall Tel Kidderminster (07816) 3716 or 2640

LYNX 96K upgraded machine including software printer cable and books Quick sale offers over £200 Tel 01-856 0645

IKON HOBBIT floppy tape system for BBC hardly used including six data cassettes zero memory Rom Cost £195 accept first offer over £150 Tel 01-659 9645

FOR RALE Dragon 32K in mint condition includes over £160-worth of software joysticks manual and books Will sell for £200 ono Tel (St Helens) 051-430 0741

ORIC 16K plus one tape worth £10 Unwanted gift, sell for £80 or swap for 48K Spectrum Tel Crawley 518400

16K ZX81 and software £45 Tel 0905 842826

ZX81s for sale

ZX81 plus 16K RamPack printer cassette recorder £25 software ZX81 executive case Worth £155 sell for £115 or swap for Vic20 plus cassette Tel Wakefield 258787

ZX81 16K, manual guide set Sinclair belt, software Pimania Avenger etc Best offer secures Tel Thornham Common 6421

ZX81 16K Ram leads manual machine code book two games books £90 of software including Flight Simulation Galaxians Labyrinth Space Raiders £90 ono Tel Glossop 3516

ZX81 SOFTWARE included Brick Stop QS Scramble QS Defence and QS Asteroids All tapes in original condition Tel 0984 23763 for details and prices. No offers ignored No time wasters

ZX81 16K, software — Trader £5 Flight Simulation £4 Orwell cassette four £4 3D Defender £4 QS Scramble £3 Space Raiders £3 Mr A B Wheeler 38 Bede Road Burnant Castle Durham

ZX81 and 16K Ram pack, with manual including power supply and all software worth £16 and print n plotter pad well suited for use for beginners £50 ono Tel 01-960 0064 evenings

ZX81 16K, leads manual PSU books £200-worth of software — all current superb condition would make a nice Christmas present make me an offer might accept Tel 042 879 3813

16K ZX81 plus leads and manuals software including Pimania Flight Simulation Catacombs, Sorcerers Island etc + Mastering Machine Code book by Toni Baker £60 ono Tel 07[illegible] (Essex) 475022

ZX81 16K memory pack, Kempston keyboard case box and £40 of software selling it for £75 Tel 01-6[illegible] 3817

ZX81, 16K Ram, including books programs and consul Price £60 Cruse 3 Dorset Way Twickenham TW2 6NB

ZX81 16K Fuller keyboard joystick interface software book and magazines cost £160 very good condition £65 ono Tel Bourne End 24201 after 5 pm

16K ZX81 plus £28 of software immaculate condition still boxed with manual £40 sell Sinclair 16K Ram pack as new £15 Romford 61557

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ZX81, 16K Ram pack QS Scramble selling it for £65 offers considered 01-575 3885 ask for Levine

16K ZX81 + Fuller keyboard excellent condition with £50 of software and loads of magazines will sell separately or as lot for £70 ono Tel 01-6[illegible] 8971

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ZX81 16K QUALITY KEYBOARD, 30 games manual and leads £65 ono Tel 0862 811368

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VIC20 with cassette unit 3 months old 2 games including Fly Snatcher Blitz and Alien Blitz Asteroids Food Machine sell for £120 Tel (Hastings) 431186

VIC20, C2N cassette deck, boxed pack with Introduction to Part I 27 games boxed as new 6 months old 6 months guarantee left, sell for £150 Tel Crawley 22141

ORIGINAL VIC20 3.5 ARCADE GAMES including Asteroids Pucky Astro-Land Treasure Maze Target Shoot, all on one great cassette and only for £3.95 Phone Northwich 782475 after 5 pm

VIC20 plus 16K Ram 8 months old, plus software £125 Phone 01 868 1678 after 6.30 pm

16K VIC20 cassette unit, super expander Omega Race hi-res graphics, book joystick, many other games, worth £300 selling for £150 Tel 0683 48554 (evenings)

VIC20 + cassette unit + 3K super expander + Star Battle cartridge + software cost £265 sell for £120 Tel 01 204 4586 (after 4 pm)

VIC20 + C2N cassette recorder + 8K, 14 games cartridges + Programmers Aid + Mission Impossible £400 of software Vic Revealed + compiler Forth + Chess worth £700 sell for £180 — will hire expander Tel 01 579 2129 after 4.30 pm

VIC MEN original tape for Vic20 offers? Tel Stevenage (0438) 811634 after 7 pm

VIC20 SOFTWARE, over 25 Vic20 tapes (originals only) at £2-£3 each e.g. Micropoly Battle of Britain Snooker etc Tel 0438 811634 after 7 pm

COMMODORE VIC20 FOR SALE, including games cartridge £70 ono Tel Chorley (02572) 75035

21K VIC20 + C2N + Introduction to Basic I + 4 cartridges + Point Master + £300 of software cost £700 sell for £230 ono Tel Reading 883238

VIC20 SOFTWARE to swap or sell Tel 05212 3503

25 UNEXPANDED VIC20 GAMES (yes 25) including Ski-Run Pontoon Slot Machine 5 adventures hi/low etc only £5 !!! Phone Lye 3057 after 6 pm (ask for Adnan)

VIC20 SPEECH SYNTHESISER CARTRIDGE, cost £65 unwanted gift with full instructions and demo cassette £40 ono Mr D Oldfield 50 Albion Terrace Lynemouth Northumberland NE61 5TA

VIC 1540 SINGLE FLOPPY DISK to swap for Commodore 64 with cassette recorder or will sell for £280 ono Tel 0622 813784

VIC20 + C2N + 8K + 8K + 16K + joystick + programme reference guide etc swap 48K Spectrum Phone 01 858 2261 (daytime)

VIC20 + 16K (8K 3 slot motherboard + 8K cartridge) cassette unit good condition leads of software joystick 3 good books only £130 ono Paul Johnston 7 Dunelin Road Corby NN18 9JX

VIC20, C2N + 16K + 8K revision programs Dr Watson's Assembly + over 45 original games including Arcadia Skyhawk, plus much more Also manuals reference guide will 'ben separate or all for £250 Call Ketan at 788-0630 (evenings)

VIC20 £73 ono Innovative computing £00 Getting Acquainted with your Vic £2 Bug-Byte Asteroids £5 Backgammon £5 Audiogenic Amok £4 programmer's reference guide £8 Quicksilva Skyhawk £7 Quakcover £1 Starbattle £7 Christchurch (0202) 583607

COMMODORE 64 with cassette unit plus handbook and £30 worth of software £200 Tel 43636 (daytime) 371538 (evenings) Derby

VIC20 with tape recorder 20K expansion joystick, £200 of software + books + magazines sell for £150 or swap for 48K Spectrum Tel High Wycombe (0494) 718520

VIC20 Adventureland cartridge will swap for any other in Scott Adams series or sell for £8 Tel Rochdale 0706 358416

VIC20 lightpen + games cost £34.50 Bargain at £22 Ring 0745 60690 (after 6 pm) ask for Michael

VIC20 1 month old Introduction to Basic Part I C2N tape recorder Personal Computing for the Vic20 £30 software sell for £100 Tel 359 1151

VIC20 + 16K Ram switchable + 2 games cartridges + programmer's reference guide + 20 games etc on tape + magazines £90 Phone Walton (0932) 229646

VIC20 16K RAM PACK, £300 of software joystick, books six months old excellent condition many cartridge games All for £225 Tel 691-1758 evenings

VIC20 plus C2N cassette unit plus joystick, all leads and software £110 Tel (Southend) 0702 713755

VIC20 plus C2N cassette 8K, super expander Sutt plus motherboard light pen joystick literature and many games worth £370 sell for £280 Tel Bolton 363680 after 5 pm

VIC20 cassette joystick, £20 worth of software manual programmer's reference guide and magazines £100 ono Tel 01 943 0856

VIC20 DATACASSETTE BOOKS 3K Ram 16K Ram Super Expander 30-40 plus tapes three games cartridges machine code monitor good condition boxed Tel 0203 (Coventry) 78831

VIC20 CARTRIDGES for sale or swap for BBC B software Avenger Ratrace Jelly Monsters Alien Star Battle Road Race Adventure Land £12 ono each Tel Chelmsford (0245) 468964 after 6 pm or weekends

VIC20 plus cassette unit, with dust cover and quick shot joystick, five books lots of magazines and lots of software i.e. games music educational etc Offers please Tel 061-339 3227

COMMODORE 64 plus Commodore cassette player and games plus program book and magazines etc Purchased last month Mint condition Offers realistically of £280 Tel 01 868 7325

VIC20 still under guarantee C2N cassette player joystick plus two cartridges eight machine code games Vic programmer's reference guide £110 ono Tel Radlett 7506

VIC20 plus cassette deck introduction to Basic Part 1 joystick and 16K switchable Ram Pack plus £80 of software and magazines and books sell for £200 Tel 6583824

VIC20 BOOKS software £75 16K Ram Programmers Aid Hesmon £20 each All boxed as new Tel 654 4890 after 6 pm

VIC20 Chopper cartridge for sale £20 cost £26 (needs a joystick) Tel (0222) 842649 after 5 pm

VIC20 16K, C2N cassette deck super expander joystick Jelly Monsters Avenger Road Race Adventure Land Pirate Cove Physics Revision Cassettes Excellent condition sell for £150 Contact John Mudge on Uxbridge 38397

COMMODORE VIC20 cassette deck super expander point master joystick, games including Avenger Sargon Chess cartridges 10 months old £150 Tel (0855) 4712

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VIC20 ETTO/SOSTELL, under guarantee CN2 unit plus expansion all £130 Tel Farnborough Kent 54609

VIC20 plus C2N plus 16K Ram and Introduction to Basic plus £75 of software £166 Tel 041 772 2058

VIC20 C2N TAPE DECK, 32K Ram Pack switchable to standard plus 3K plus 16K plus 24K plus 32K One hand quick shot joystick books manuals and magazines Cassette software Under guarantee. Offers Tel 0981 250420 after 5.30 pm

COMMODORE VIC-20 C2N Lots of programs and books All leads, 10 months guarantee Boxed for £100 Tel 0508 414432

VIC20 C2N super expander Introduction to Basic Part 1 and many other books software including seven cartridges and 15 cassettes over £500 when bought, will accept £350 Tel Blackburn (0254) 662386 between 5 pm and 7 pm

COMMODORE VIC20 with 16K Ram pack C2N cassette deck £166 of software two educational cassettes, English and physics one three ram cartridge one dust cover Arcade software including Martian Raiders and Paratroopers £165 Mr S R Katshik er 22 Woodgrange Avenue Kenton, Harrow

VIC 15-15 PRINTER, including word pro cassette and new ribbon £120 Tel Eversley (0734) 732266

COMMODORE VIC20 3/8K joystick, tape cassette unit over 25 cassettes and three games cartridge £200 Tel Fareham 230658 or write to 14 Drysles Close Bridgeway Gosport PO13 0SL

VIC20 16K CASSETTE UNIT, £200 of software £30 of books one joystick five cartridges £220 ono or possibly swap 48K Spectrum with cassette and printer Tel Leeds (0532) 772918

VIC20 SOFT SWITCH, never used £18 Tel Aldridge 51023

COMMODORE 64 1541 disc drive plus daylight pen reference guide All for £50 Tel 01 603 2931

VIC20 plus cassette deck and three joysticks Many books including Programmer's Reference Guide loads of software £150 Tel Denham 860 283 after 5 pm

16K FOR VIC20 with five 16K games £30 Tel 01 387 6751 evenings

VIC20 plus C2N 3K expansion cartridge two games cartridges 15 commercial software games including adventures and tape copier and joystick magazines and books as new worth £350 will sell for £150 Tel Blackpool 882323

VIC20, with 16K cassette deck, joystick paddles many magazines cassette games £170 ono Tel Romford 67307

16K VIC20 plus cassette deck joystick and plenty magazines cassette games £165 ono Tel Upminster 50552

VIC20, 16K, C2N cassette joystick, £150 worth of software books magazines cost over £350 sell for £200 ono Tel Lindfield 2677 evenings

VIC20 Adventureland cartridge swap for Rat Race or other adventure cartridge except Count Tel Nottingham 204058

COMMODORE PET 8001, built-in green screen plus cassette recorder 64K £200 Tel Reading 508211

VIC20 C2N 16K 3K super expander four games cartridges Gorf Sargon Chopper The Count Adventure £180 Cassette software joystick will not separate £170 ono Tel Bexhill (0424) 221298

VIC20 ALIEN cartridge will swap for any Commodore adventure cartridge except Mission Impossible Tel Newton Abbot (0626) 3005 after 4 pm

Tandys for sale

TANDY TRS80 still boxed 16K Level II with 2 manuals, £180 Tel 673370 (Birmingham)

16K VIDEO GENIE, some software available all leads + manual £150 Tel Lewington 2596

32K GENIE, 2 weeks old £120 or swap for Vic20 Mike 01-701 4115

VIDEO GENIE 16K, built in cassette 14" TV including lots of extras fully expandable excellent condition £200 Tel Nottingham 384961 for more details

COLOUR GENIE 16K software books manuals all leads brand new in original packing, £180 Tel (051) 678 5257

Dragons for sale

DRAGON 32 guarantee boxed new plus leads manuals £15 of magazines £6 of books, £113 of original software ideal Christmas present total £338 plus joysticks, offers Ring 772 3938 after 5-7 pm ask for Martha Piggott

DRAGON 32, almost new £100 joysticks cassette recorder plenty of software arcade games adventures etc all very good condition all for £200 Tel Bedford 57407 after 5 pm

DRAGON 32 2 joysticks cassette recorder 3 cassette games, 2 cartridge games nearest offer to £150 Tel 01-886 7080

DRAGON 32, cassette recorder 30 tapes including Donkey King Caterpillar Attack and Planet Invasion two joysticks books + magazines, £180 Tel 01 703 7985

DRAGON 32 plus 20-inch colour TV over £100 of software plus joysticks 6809 machine code manual etc just £290 Tel 0792 66864 after 6 pm

DRAGON 32K computer games plus two games programming book. Worth £84 will sell for half price or £4 each or swap for knitting machine in working order Tel (St Helens) 051-430 0741

DRAGON 32, joysticks, cassette recorder plus £20-worth books, £80-worth software including Cosmic Invaders cartridge Donkey King Frogger etc and Dragon User magazines A bargain at £185 Tel West Lothian 0506 37745

DRAGON 32, nine cassette games 10 books and two joysticks Sell for £280 ono Tel Rugby 3855 after 4 pm

DRAGON 32, three joysticks three books £230-worth of software Offers around £170 considered Tel Bishop's Stortford 815623 after 5 pm

DRAGON 32 £200 of software including £50 word processor Sony cassette recorder two joysticks and instruction manual Cost £375 sell for £215 ono Excellent condition boxed Tel 01-440 2227

DRAGON 32K, together with joysticks light pen telewriter word processor and games £210 ono Oric 1 48K plus Oricbase Zodiac and Flight, £110 ono Phone Nigel 01-485 1383

DRAGON 32, software 2 joysticks, £430 Tel 0744 27738

DRAGON 32 boxed joystick 5 games, book + manual + 4 Dragon User magazines + all leads £140 Tel High Wycombe 715788

DRAGON 32, tape recorder joysticks light pen books magazines and £41 worth of software Dragon Trek Pimania Cross Quest Defence will sell for £200 ono or swap for CBM 64 + C2N cassette unit Northampton (0604) 28319

DRAGON 32, boxed as new with manuals boxes dust Dragon data, joysticks Calixo Island and program books £170 ono Ring 061 486 8694 after 7.30 pm (not Wednesday)



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PCW 8/12

LOGIC 3
– THE KEY TO THE WORLD OF TOMORROW –

UP AND AWAY



At last a genuinely interesting educational package for the Spectrum — *Ballooning* from Heinemann Educational Books

The program itself involves piloting a balloon over various hills and mountains, using vents to lower you and the burner to raise you up. At various points in your trip you will be given different tasks to complete like getting and delivering medical supplies

The manual/booklet not only describes the operation of the game, but is full of puzzles and information about the history of ballooning — all illustrated with photographs and colour drawings

Other programs in the same series involve driving and being a special agent — your children might actually enjoy this series, maybe even learn something

Program *Ballooning*
Price *£9 95*
Micro *Spectrum 48K*
Supplier *Heinemann Educational Books, 22 Bedford Square, London WC1B 3HH*

DREADED BUGS

Lothlorien is well known for its excellent war-gaming simulations, so its latest move is slightly surprising — the company has released a series of arcade games for the Spectrum and Oric 1

Micro Mouse is the Spectrum game and is superb. It introduces an idea so obvious you wonder why nobody ever thought of it before. The program is about making a program

On screen are the lines of a program that won't run because some bugs have stolen some of the letters and numbers in the program. *Micro Mouse* has to retrieve the stolen letters and replace them in their correct positions in the program

He is hampered in his task by the dreaded bugs whom he must avoid at all costs. From time to time Micro is given a chance at revenge via a can of Datakill which wipes them all out for a while

Once a program is completed it will run and you are treated to another, more complex, program to debug. The game is graphically excellent with smooth-moving sprites

Program *Micro Mouse*
Price *£5 95*
Micro *Spectrum 16/48K*
Supplier *M C Lothlorien, 56A Park Lane, Poynton, Stockport, Cheshire SK12 1AE*

PRICE PROBLEM

One of the things that led to a falling off in the numbers of Dragon 32s being sold was almost certainly the lack of quality software

Now that the Dragon has been given a new lease of life by various injections of cash, Dragon Data are obviously keen to ensure that history does not repeat itself. To this end it has just issued 11 new games — all professionally packaged in what look like large video cases

Whirlybird Run is a *Scramble* style game in which you pilot a helicopter over mountains and hills and past missile defences

Later levels include swarms of alien fighters trying to knock you out of the sky. Like the original, you must replenish your fuel supply by bombing the enemy fuel dumps (why this should work is a mystery to me)

The game is graphically good, with the helicopter's rotors seeming to turn, and is also fast and addictive. Up to this point, then, I would recommend the game. The problem is the price — £12 95 really isn't justified even with the big box and two page manual. A Spectrum equivalent would cost more like £6

Program *Whirlybird Run*
Price *£12 95*
Micro *Dragon 32*
Supplier *Dragon Data, Kenfig Industrial Estate, Margam, Port Talbot, West Glamorgan*

HELPFUL CLUES

Twin Kingdom Valley is an illustrated adventure game for the Acorn machines and the Commodore 64

Like the *Hobbit* it is basically a text style adventure, but with every scene illustrated. In this case there are 175 different illustrations — some of which may contain helpful clues so they are more than just dressing

Judging by the screen shots the graphics are well up to *Hobbit* standard and in other ways the games are comparable — both, for example, feature the passage of time as an important ingredient. Both can manage quite complicated instructions and more generally their worlds are similar — full of dragons and caves, treasures and forests

Bug-Byte doesn't seem worried by its illustrious competition (now that *Hobbit* is on BBC and 64) though. At the bottom of the advertisements is the legend 'Eat your heart out Bilbo!' — whether he will remains to be seen

Program *Twin Kingdom Valley*
Price *£9 50*
Micro *BBC/Electron/CMB 64*
Supplier *Bug Byte, Mulberry House, Canning Place, Liverpool*

FILM SET

Zodiac was the first of the Oric adventures to achieve anything like the cult status of the Artic adventures. So, there will be quite a lot of interest in the follow-up *House of Death*

Although basically a text adventure in the classic mould, there are various puzzles and intelligence tests built into it

The setting is a disused film set, the location for such classic horror films as *An American Werewolf in Guernsey*. The task is to find five treasures and return them to the starting place

Aside from logical puzzles problems can also take the form of monsters from the movies like werewolves, Dracula, etc

Program *Oric House of Death*
Price *£9 99*
Micro *Oric 1*
Supplier *Tansoft, Units 1 and 2, Techo Park, Newmarket Road, Cambridge*

PURE FANTASY

For those of you who like me had their imagination fired by the sequence in *2001* when the space ship slowly docks with the space station to the music of the Blue Danube, a new program may help you live out your fantasy to the full

2002 is a sophisticated simulation of the famous docking sequence with you at the controls of the Orion spacecraft

The high resolution of the BBC, coupled with superb 3D gives a spellbinding effect There are six skill levels for everyone from the complete novice to the experienced astro pilot

Program *2002*
Price *£7.95*
Micro *BBC B*
Supplier *Superior Software*
Dept C
69 Leeds Road
Bramhope
Leeds

SLIDER TOY



Jumbly is here Quite a few people wondered what those teasing adverts saying *Jumbly is coming* were all about Now we know

Jumbly is a computer version of those slider toys in which you have to move around various plastic tiles to make a picture

However what used to be a couple of hours entertainment has been extended to a couple of months worth by a number of special features Most importantly, there are a series of pictures — what number has not been given away

Some of the pictures scroll in different directions making it much harder to see what you are doing Each picture also has a target number of moves in which it must be solved — only if you equal or beat this will you be allowed to go to the next one

It is absolutely infuriating and my reaction was to throw something at the tv — others will doubtless get days of masochistic pleasure

Program *Jumbly*
Price *£6.95*
Micro *Spectrum 48K*
Supplier *D K'Tronics*
Unit 2
Shire Hill Industrial Est
Saffron Walden
Essex CB11 3AX

ARCADE HIT

Every so often seemingly by some sort of Jungian telepathy all the software houses decide to bring out home micro versions of an arcade hit at exactly the same time

This month it is the bizarre game *Qbert* This involves bouncing a funny little creature up and down a stack of cubes trying to land on each one This is made more difficult by the presence of various similarly bouncing missiles that tumble down the stack

There are any number of versions of the game for any number of machines (although I have not yet seen one for Spectrum)

One of the best is *Humphrey* which is true to the arcade original in every way except that the layout of the cubes changes with each screen of action It runs on the Commodore 64 and is graphically excellent

Program *Humphrey*
Price *£6.90*
Micro *Commodore 64*
Supplier *Mr Micro*
69 Partington Lane
Swinton
Manchester M27 3AL

ABOVE STANDARD

If only it had the software back up the Texas TI99/4A would look excellent value for £90 Doubtless it s now far too late for this situation to change dramatically but there are some interesting new programs around

Adventuremania is a graphics adventure which uses all 16K and all colour sets It s set in London — your first location is Trafalgar Square The sleeve notes contain the dark warning beware the ungodly are everywhere presumably this means the tourists

The game is supposed to be fiendishly difficult — you don t even find out where you are going and what you are supposed to do until you find the hidden instructions half way through the adventure The game looks above the usual Texas standard without being the usual high Texas price

Program *Adventuremania*
Price *£5.95*
Micro *Texas Instruments 99/4A*
Supplier *Intrigue Software*
Cranbrook Road
Tenterden
Kent TN30 6UJ

VISUAL MENU

There s no doubt about it The Commodore 64 has great sound — if there's a single reason to switch from a Spectrum that's it

The problem is the effects are not very easy to get at — around five *Pokes* per noise If only someone could make it simpler

They have (aren t market forces wonderful) and *Ultisynth 64* is the result The program enables you to use your Commodore 64 as a synthesiser record your creations and play them back

What the program does essentially, is enable you to control the various parameters of each sound using a visual menu — for the note values you can use the keyboard playing it like a piano

What the program proves once again is that the Commodore 64 is a wonderful machine (some of the sounds are really impressive) but one that Commodore have documented very badly indeed — hence the place for programs like this The manual that comes with the program is excellent

Program *Ultisynth 64*
Price *£14.95*
Micro *Commodore 64*
Supplier *Quicksilva*
Palmerston Park House
13 Palmerston Road
Southampton
Hampshire
SO1 1LL

LOST TOMB



Aztec Tomb is a graphic adventure for the Commodore 64 from Alligata Software It s vast, taking 15 minutes to load so it should see you all through Christmas

Your task is to locate a lost Aztec tomb hidden deep within the Amazon rain forest Each location in the jungle is illustrated by a picture like the *Hobbit*

The cover blurb warns you that this is no ordinary jungle strange things can and will happen The scope of the program and quality of the graphics should ensure that this one does well

Program *Aztec Tomb*
Price *£7.95*
Micro *Commodore 64*
Supplier *Alligata Software*
178 West Street
Sheffield S1 4ET

New Releases is designed to let people know what software is coming on to the market If you have a new game or utility which you are about to release send a copy and accompanying details to New Releases Popular Computing Weekly 12-13 Little Newport Street, London WC2R 3LD



This Week

Program	Type	Micro	Price	Supplier
Advertiser	Ut	Spectrum	£17.50	Brane
Alien Swoop	Arc	Spectrum	£4.50	Space Age
Aliens	Arc	Aquarius	£9 95	Add On
Battlezone	S	BBC	£8 95	Lothlorien
Beyond Belde	Ut	Spectrum	£8 95	Sinclair
Bubble Troubls	Arc	Spectrum	£6 50	Arcade
Bugged	Arc	Dragon	£8 95	Dungeon
Business Pack No 1	Arc	BBC	£195 95	Gemini
Business Pack No 2	Ut	BBC	£79 95	Gemini
Business Pack No 3	Ut	Electron	£79 95	Gemini
Chuckman	Arc	Aquarius	£9 95	Add On
Cosmic Split	Arc	Commodore 64	£7 95	PSS
Creator s Eye	Arc	Commodore 64	£7 95	Mogul
Data Genie	Ut	Spectrum	£9 95	Audiogenic
Diabetes	Ut	Spectrum	£8 95	Martin Duntz
Dietician	Ut	Spectrum	£8 95	Keysoft
Ed On	Arc	Aquarius	£9.50	Add On
Evolution	S	Spectrum	£8 95	Microsphere
Family Pack	Arc	Spectrum	£8.50	Keysoft
Family Tree	S	Spectrum	£8.50	Keysoft
Fig Forth	Ut	Commodore 64	£19.99	Romik
Fire Hawks	Arc	Spectrum	£6 95	Postern
Five Treasures	Ad	Spectrum	£6 95	Space Age
Floyd s Bank	Arc	Lynx	£9 99	Romik
Freez Bees	Arc	Spectrum	£5.95	Silversoft
Galaxy	Arc	Commodore 64	£7 95	Anirog
Gamez Pack 1	Arc	Lynx	£7 95	Gem
Happy Letters	Ed	BBC	£8 07	Bourne
Home Pack No 1	Ut	BBC/Electron	£79 95	Gemini
Home Pack No 2	Ut	Spectrum	£59 95	Gemini
House of the Living Dead	Arc	Spectrum	£5 90	Phipps
Keyfile	Ut	Spectrum	£7 95	Keysoft
Kick Off	Arc	Commodore 64	£8 99	Bubble Bus
Killer Knight	Arc	Spectrum	£6 90	Phipps
Krystals of Zong	Arc	Commodore 64	£7 95	PSS
Lase Shakun	Arc	Spectrum	£5 95	Puppy
Light Cycles	Arc	BBC B	£7 50	Pesan
Loony Zoo	Arc	Spectrum	£5 80	Phipps
Magic Meanies	Arc	Spectrum	£5 95	CDS
Metamorphosis	Arc	Commodore 64	£7 95	Mogul
Mitrot Drive In	Arc	Spectrum	£5 95	Softel
Military Quiz	S	BBC	£6 90	Logic Soft
Moby Dick	Arc	Commodore 64	£7 95	PSS
Mr Wimpy	Arc	Spectrum	£5 90	Ocean
Music Master	Ut	Spectrum	£9 95	Sinclair
Music Mohkun	Ut	Spectrum	£4 50	Space Age
N Vaders	Arc	Aquarius	£9 95	Add On
Neoclyps	Arc	Commodore 64	£7.95	PSS
On Mummy	Arc	Lynx/Spectrum	£7 95	Gem
Orion	Ut	Oric 1	£12 95	Lothlorien
Robot Riot	Arc	Spectrum	£5 95	Silversoft
Roman Empire	S	Lynx	£7 95	Lothlorien
Sam Spade	Arc	Spectrum	£8 95	Silversoft
Scan	S	BBC B	£7 95	Pesan
Sam ller	Ut	Spectrum	£7 95	Brane
Spanner Man	Arc	Lynx	£7 95	Gem
Sub Chase	Arc	Spectrum	£4.50	Gem
Tank Attack	Arc	BBC B	£7 95	Gem
Three Dee Space Wars	Arc	Spectrum	£5 95	Spectrum
Timeman Two	Ed	BBC	£8.97	Bourne
Turbo Grib	Arc	Vic20	£5.50	Microdeal
Urban Upstart	Ad	Spectrum	£6.50	Richard Shepherd
Util 1	Ut	BBC B	£9 95	Gem
Wheelie	Arc	Spectrum	£8 95	Microsphere

This Week is a new section that covers all the new software coming on to the home micro market each week. All suppliers should send details of their new programs to This Week, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD

Key: Ad — adventure/Arc — arcade/Ed — education/
S — strategy-simulation/Ut — utility

Book Ends

PROPER BASIC

An excellent book for those who believe in doing things properly even if that means paying more is *Proper Basic* by Brian C Walsh

Although clearly written and full of diagrams, the book looks as though it is primarily intended for schools and colleges. It contains more or less everything you could ever need to know about Basic in all its forms

The book would be a good reference work for questions about the theoretical nature of Basic, but make sure it's really what you need — it costs £12 50.

Book *Proper Basic*
Price *£12 50*
Micro *General*
Supplier *John Wiley*
Baffins Lane
Chichester
West Sussex
England PO19 1UD

MYSTERY

A nice idea for the younger computer owner *The Bytes Brothers Input an Investigation* is a book in which fiction is interlaced with computer programs. The Bytes Brothers use the programs to help solve their mysteries

Not, I should stress, that there is anything very gory or nail-biting about any of the stories. They're all about solving science projects and finding out how many marbles are in a jar

Book *Bytes Brothers Input an Investigation*
Price *£1 25*
Micro *General*
Supplier *Fontana Paperbacks*
8 Grafton Street
London W1X 3LA

EDUCATION

More than anything else the BBC computer is associated with education — both of children and adults

BBC Micro in Education is a book aimed squarely at this market and is intended to be used by teachers within classwork as well as in homes

The book is a mixture of general information about the history and development of computers as well as specific instruction on BBC Basic

Book *BBC Micro in Education*
Price *£6 50*
Micro *BBC*
Supplier *Shiva Publishing*
4 Church Lane
Nantwich
Cheshire CW5 5RQ

Top 10

BBC*

1	(6)	Planetoids	(Acornsoft)
2	(2)	Hopper	(Acornsoft)
3	(1)	Rocket Raid	(Acornsoft)
4	(—)	Chess	(Acornsoft)
5	(4)	Alien Swirl	(Program Power)
6	(7)	White Knight Mk 2	(BBC)
7	(3)	Swoop	(Program Power)
8	(5)	Castle of Riddles	(Acornsoft)
9	(8)	Monsters	(Acornsoft)
10	(—)	Dr Who — The First Adventure	(BBC)

All model B.
(Figures compiled by Micro Management, Ipswich 0473 59181)

Atari

1	(—)	Miner 2049er	(Big Five)*
2	(—)	Shadow World	(Synapse)†‡
3	(5)	Zaxxon	(Datasoft)
4	(—)	Ultima II	(Sierra On-Line)§
5	(—)	Masterfier	(Sierra On-Line)‡
6	(—)	Savage Island Part 1	(Adventure International)†
7	(—)	GFS Sorceress	(Avalon-Hill)†
8	(—)	Lords of Karma	(Avalon Hill)†
9	(—)	Escape for Power 7	(Channel 8)
10	(10)	Preppie	(Adventure International)

*Cartridge †32K cassette. †48K cassette ‡32K disc §48K disc.
(Figures compiled by Calisto Computers, Birmingham 021-632 6458)

Vic20

1	(3)	Wacky Waiters	(Imagine)
2	(1)	Arcadia	(Imagine)
3	(—)	Jetpac	(Ultimate)
4	(—)	Catcha Snatcha	(Imagine)
5	(—)	Flight Zero-One-Five	(AUS)
6	(—)	Tombs of Dorth	(Audiogenic)
7	(7)	Skyhawk	(Quicksilva)
8	(6)	Gridrunner	(Llamasoft)
9	(3)	Wizard and the Princess	(Melbourne House)
10	(—)	Paratroopers	(Rabbit)

(Figures compiled by Boots & Co/Websters)

ZX81*

1	(—)	Flight Simulation	(Psion)
2	(—)	Football Manager	(Addictive Games)
3	(—)	1K Games	(Artic)†
4	(1)	Defender	(Quicksilva)
5	(2)	QS Scramble	(Quicksilva)
6	(—)	Planet of Death	(Artic)
7	(—)	Invaders	(Quicksilva)
8	(—)	Mothership	(Softsync)
9	(4)	1K Chess	(Artic)†
10	(3)	Asteroids	(Quicksilva)

*All run in 16K. †1K only
(Figures compiled by Boots & Co/Websters)

Spectrum

1	(4)	Chequered Flag	(Psion)
2	(7)	Ant Attack	(Ultimate)*
3	(—)	The Pyramid	(Fantasy)*
4	(3)	3d Ant Attack	(Quicksilva)
5	(2)	Kong	(Ocean)
6	(1)	Lunar Jetman	(Ultimate)*
7	(5)	Manic Miner	(Bug-Byte)
8	(10)	Splat!	(Incentive)
9	(8)	Flight Simulation	(Psion)*
10	(—)	Scrabble	(Psion)

Requires 48K.
(Figures compiled by W H Smith and Son London)

Books

1	(5)	BBC Micro Disk Companion *Latham*	(Prentice-Hall)
2	(4)	Spectrum Microdrive Book, *Logan*	(Melbourne House)
3	(9)	Spectrum Interfacing and Projects, *Bishop*	(McGraw-Hill)
4	(8)	Adventure Graphics for the ZX Spectrum, *Angell and Jones*	(Macmillan)
5	(2)	30 Hour Basic *Prigmore*	(NEC)
6	(8)	Using the 64 *Gerrard*	(Duckworth)
7	(—)	CP/M — The Software Bus *Clarke*	(Sigma)
8	(—)	Adventure Programming Techniques for the BBC Micro *McGregor and Watt*	(Addison-Wesley)
9	(10)	Commodore 64 Programmer s Reference Guide *Commodore*	(Commodore)
10	(—)	Master Your ZX Microdrive *Pennell*	(Sunshine)

(Figures compiled by Watford Technical Books, Watford 0923 21394 Peeks 38894)
(Last week's position in brackets)

Dragon 32

1	(2)	Pettigrew s Diary	(Shards)
2	(1)	Mined Out	(Quicksilva)
3	(5)	Dragonfly 2	(Hewson)
4	(—)	Transylvanian Tower	(Richard Shepherd)
5	(—)	Cuthbert Goes Walkabout	(Microdeal)
6	(—)	SAS	(Peaksoft)
7	(4)	Ring of Darkness	(Wintersoft)
8	(—)	Tiger Grand Prix	(Tiger)
9	(—)	Dragon Trek	(Salamander)
10	(7)	Champions	(Peaksoft)

(Figures compiled by Boots & Co/Websters)

Ziggurat

Structured Pascal

Last week I examined some of the features of Forth picking out those I think should appear in our ideal language. This week I'll look at Pascal in the same way.

The most notable feature of Pascal is that it is structured. Effectively this means that it discourages you from using *Goto* statements by providing *Repeat*, *While* and *Case* statements. Some beginners feel that structured programming is not beneficial but I must stick my neck out and say that faster, better programs will be written if you use structured techniques.

Amateur programmers or beginners find *Goto* easier to use, but our ideal language is not aimed at either group. Beginners are well served by Basic, Pascal and Logo, whilst amateur programmers who persist in ignoring structured programming are doing themselves a disservice.

Thus, our ideal language will use the three basic structures of Pascal. Other elements of the structured nature of Pascal are the procedures and functions. I covered these in my last column, drawing the conclusion that not only should one be able to define procedures and functions but also operators.

In addition, Pascal offers user defined data types. These are a great idea on the whole, but they lead to the odd Pascal situation where types cannot be mixed — eg $A := 2+2.0$ causes a crash on most systems. I suggest user defined types should be implemented with automatic type conversion where feasible.

One of the most important features of Pascal and its siblings such as Algol and BCPL is the block structure. This allows you to treat a group of statements as a single statement if they are bracketed by special words or symbols. This is admirable since it makes the language easy to compile and interpret but is difficult for beginners to learn. However, one has to draw the distinction between easy to learn and easy to use. Block structuring is a tricky concept for some people, but once grasped it is elegant and simple to use.

The feature of Pascal that seems to annoy people most is the use of the := symbol to indicate an assignment statement. I am inclined to make the colon optional, on the understanding that many people do not find it necessary, especially those reared on Basic.

A major disadvantage of Pascal is that it is rarely interpreted. As I said before, our language must be both interpreted and compiled, to allow easy program development and both speed and security from the compiler.

This leads to several problems. For example BBC Basic provides the *Eval* function to evaluate an expression. This is very useful in graph plotting applications, but it is impossible to compile. For example, consider the fragment:

```
D=23
D=A$ D*2"
PRINT EVAL(A$)
```

When this is compiled, the computer will no longer know the variables *D* and *A$* by name, only by their address. Thus it will not be able to compile the previous routine.

The name of each variable could be stored in the compiled program, but it would add considerably to the space it takes up. A more pertinent objection is that the compiled code will need access to a complete expression evaluator which forms a substantial part of the interpreter itself. Thus, the compiled code would swell to enormous proportions if *Eval* was used.

So I maintain that certain functions are impossible to compile. This leads to an interesting question — should we provide these functions in the interpreter but not in the compiler? If we do, there will be incompatibilities between the two, which is ugly. So do you attach more value to compatibility or to features? Personally I am tempted not to provide such functions at all but there is room for debate on the subject.

Finally, some people have asked whether this series is building up to naming a specific language as the mythical ideal. I shall not divulge the answer yet — but it would be nice to find our ideal language existed. ■

Jeremy Ruston

Puzzle

Forty thieves

Puzzle No 85

Once upon a time, many years ago, not far from old Baghdad, lived Ali Baba and his 40 thieves.

In their secret cave they examined the spoils of their latest robbery — a fortune in emeralds. The precious stones were laid out on the cave floor in the form of a triangular pattern similar to the one shown here.

As there were more jewels than is shown, the triangle was much larger than this, but its general arrangement was as illustrated, with every row being complete.

The next day, when Ali Baba awoke, he found to his horror that the 40 thieves had departed taking with them all but one of the jewels. They had divided up the jewels equally amongst them and, as they had one left over, they left it for poor Ali Baba.

What was the smallest number of gems that could have been present?

Solution to Puzzle No 81

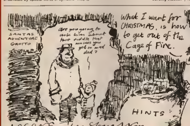
The program generates integer squares, *Z*, and tests to see if each is made up of two integer squares, $A \times A$ and $B \times B$.

```
10 LET X = 7 20 LET P = 1 30 LET Q = 1 80 LET Z =
X*X 90 FOR A = 1 TO X - 1 90 IF A*A>= P*10
THEN LET P = P*10 100 FOR B = 1 TO X - 1 80 IF
B*B>= Q*10 THEN LET Q = Q*10 90 IF (Z -
B*B)/Q = A*A*10 OR (Z - A*A)/P = B*B*10
THEN PRINT A*A = A*A, B*B = B*B, Z =
Z 100 NEXT B 110 NEXT A 120 LET X = X + 1 130
GOTO 30
```

This gives an answer of 3249 (57^2) made up of 324 (18^2) and 9 (3^2).

Winner of Puzzle No 81

The winner is G Murray, Honeyborough, Neyland, Dyfed, who receives £10




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JINGLE BILES JINGLE BILES JINGLE ALL THE DAY OH WHAT JOY IT IS TO FLY IN A
MUST WE LISTEN TO YOUR MINDLESS BAYING? YOU DON'T EVEN KNOW THE RIGHT WORDS
WEMBLEY
OH DON'T BE SUCH A GROUCH GROUCH! LET'S ALL BE HAPPY AND KEEP UP THE CHRISTMAS SPIRIT!
OKAY BE HAPPY - BUT DON'T MAKE SUCH A SONG AND DANCE ABOUT IT MEANWHILE I'VE GOT MY CHRISTMAS SPIRIT RIGHT HERE IN THIS BOTTLE!
I HOPE YOU REMEMBERED TO BRING THE PINA COLADAS AND THE PINAPPLE JUICE
GOLLY WE'RE LATE! CAN'T WE GET A SPURT ON?
WERE DOING AS WELL AS WE CAN ON ONE YAK POWER!
GOD LEST YE MELLY GENTREMEN
SOMEBODY CALL ME?
Evans
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